Input Indicators of the British Columbia High Technology Sector

2003 Edition

A joint project of BC STATS and the
Ministry of Competition, Science and Enterprise

BRITISH COLUMBIA

http://www.bcstats.gov.bc.ca

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EXECUTIVE SUMMARY

The 2003 edition of the *High Technology Input Indicators* report, which was prepared by BC Stats, in conjunction with the Ministry of Competition, Science and Enterprise is the fourth in a series of annual reports that highlight conditions affecting the province's high technology sector from a supply-side perspective. This report tracks 32 business and economic climate indicators for the province, and provides comparisons to other provinces for 28 of them. The indicators cover key aspects of the educational, business, government, external, and labour sectors from the point of view of their effect on high technology firms.

The indicators in this report, which might be termed "input" measures, are chosen for their relevance and general acceptance, as well as their availability on an ongoing basis. All indicators have been updated to the latest year available as of September 2003.

Indicators of the success, or "outputs" of the high technology sector, are covered by a companion report, the *Profile of the British Columbia High Technology Sector*.[1] The *Profile* contains information on high technology GDP, employment, wages and salaries, revenues, establishments, and exports and imports.

The picture of British Columbia that emerges from the input indicators is varied. In some areas, British Columbia compares favourably with other provinces, and has shown strong growth over the past decade. In other areas, performance has lagged. The detailed indicators offer concrete guidance about potential government policies and industry growth strategies.

A convenient feature of this publication is the simple description of the trends in each indicator as up, down, or stable (indicated in summary tables as ↑, ↓, or →). Since the 2002 edition, the trend in some indicators has been re-evaluated, based on the latest information. The trends in annual BSc graduates in engineering has been revised from stable to upward, for example. Conversely, the upward trend in the percentage of companies that are "high growth companies" was revised to stable. Moreover, two indicators have been dropped from, and three new ones added to, the 2003 edition.

Summary results for each sector are presented in the body of the report. More detailed information is contained in the tables in Appendix III.

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[1] Available at http://www.bcstats.gov.bc.ca/data/bus_stat/hi_tech.htm

Highlights

Education sector

The data for the last reporting year shows BC continuing to have the highest percentage of the population with high school education. On the other hand, BC shows a deficiency with respect to the training of new graduates in engineering and computer science. Similarly, higher education research and development (as a percent of GDP) in the province is low by Canadian standards.

Business sector

Compared to other Canadian provinces, British Columbia returns below average ratings in most of the business indicators. However, there are some positive developments. Business sector performance of research and development has lagged behind Alberta historically, but BC surpassed Alberta in 1999, to take on a third place ranking among the provinces.

Government Sector

Individual and small business tax rates in the province shrank during the 1990s, and are currently the second lowest in the country. Although the corporate income tax rate, which remained fixed from 1993 to 2001, has declined since then, corporate taxes remain higher than in other jurisdictions. As a share of GDP, combined federal and provincial government research and development activities are the lowest in the country. However, the province ranks fifth in the country based on gross expenditure on R&D as a share of GDP.

External Sector

Immigrants to Canada are increasingly well-trained and educated. BC is more or less on par with other provinces in terms of attracting skilled foreigners. In-migration from other provinces has also boosted the province's supply of well-trained, educated workers, but in recent years the flow has reversed, with the province losing people to other parts of Canada. BC imports of high technology goods—which can be an indicator of future production since imported components are often used to produce high tech products—increased steadily throughout the period examined, before falling for the first time in 2002.

Labour

Unemployment rates among workers in the natural and applied sciences fell during the 1990s, but began to creep up in 2001. However, they remain substantially lower than for the economy as a whole. In terms of researchers per 100,000 population, British Columbia moved from an eighth place ranking in 1995 to fourth place in 1998 (the latest year for which data is available). However, the number of researchers has not increased as much as total population in BC, or in most other provinces.

TABLE 1: Quick Summary of Indicators

INDICATORS	Trend	Latest year	Relative to Canadian average	Page
EDUCATION SECTOR				
E-1: High school diplomas per capita	↑	↑	above average	6
E-2: Post-secondary credentials per capita	↑	↑	below average	7
E-3: 16 year-old achievement rank: science	↑	↑	above average	8
E-4: Annual BSc graduates in engineering per capita	↑	↑	below average	9
E-5: Annual BSc graduates in computer science per capita	↑	↑	below average	10
E-6: Percentage of households with computers	↑	↑	above average	11
E-7: Percentage of households using the Internet	↑	↑	above average	12
E-8: Percentage of small businesses using the Internet	↑	↑	above average	13
E-9: Gross income per technology license at universities	→	↑	below average	16
E-10: US patents issued to top two universities	↑	↓	above average	16
E-11: Higher education performance of R&D to GDP ratio	→	↑	below average	17
BUSINESS SECTOR				
B-1: Patents per 100,000 persons	↑	↓	below average	20
B-2: Patents granted as a percent of patent applications	↓	↓	below average	21
B-3: Number of Entries to the high tech sector	→	↓	n/a	23
B-4: Number of Exits from the high tech sector	↑	↑	n/a	23
B-5: Number of high growth companies	→	↓	n/a	24
B-6: Venture capital investment	↑	↓	below average	25
B-7: Venture capital investment: share of Canadian total	→	↓	below average	26
B-8: Business performance of R&D to GDP ratio	↑	↑	below average	27
GOVERNMENT SECTOR				
G-1: Personal tax index, unattached individual with $80,000 income	↓	↓	below average	30
G-2: Small business tax rate	↓	→	below average	31
G-3: Corporate income tax rate	↓	→	above average	31
G-4: Government performance of R&D to GDP ratio	→	↓	below average	32
G-5: Gross expenditure on R&D (GERD) to GDP ratio	→	↑	below average	33
EXTERNAL SECTOR				
X-1: Percentage of immigrants with higher education	↑	↓	below average	36
X-2: Median years of schooling of immigrants	↑	→	average	37
X-3: Net inter-provincial migration	↓	↑	below average	38
X-4: High technology imports	↑	↓	n/a	39
LABOUR				
L-1: Unemployment rate for natural and applied sciences	↓	↑	above average	42
L-2: Research personnel per 100,000 population	n/a	↓	below average	44
L-3: Quality of life	n/a	↓	above average	46
L-4: Cost of Living	n/a	↑	above average	48

EXECUTIVE SUMMARY

TABLE OF CONTENTS

INTRODUCTION 1
Background 1
Comparison with Other Jurisdictions 2
The "Quick Summary" Tables 3

EDUCATIONAL INDICATORS 5
Educational Attainment 6
Achievement on Canadian Standardized Tests 8
Engineering and Computer Science Degrees 9
Technology Adoption 11
Technology Licensing 15
Performance of R&D by the Higher Education Sector 17

BUSINESS INDICATORS 19
Patents and Applications 20
Sector Dynamism: Entries and Exits 22
High Growth Companies 24
Venture Capital Investment 25
Performance of R&D by the Business Sector 27

GOVERNMENT INDICATORS 29
Tax Rates: Individual and Corporate 30
Performance of R&D by the Government Sector 32
Gross Expenditure on R&D 33

EXTERNAL INDICATORS 35
Educational Background of Immigrants 36
Inter-provincial Migration 38
High Technology Imports 39

LABOUR INDICATORS 41
Unemployment Rate in Natural and Applied Sciences 42
Research Personnel 44
Quality of Life 46
Cost of Living 48

APPENDIX I: BC STATS' SECTOR MODEL 51

APPENDIX II: DEFINITIONS OF THE HIGH TECH SECTOR 57

APPENDIX III: DETAILED TABLES 59

INTRODUCTION

Although industry has been knowledge- and technology-based throughout history, information as a driver of economic growth has grown dramatically in importance in the last quarter-century. Economies are now much more dependent on the production, dissemination, and use of knowledge. In turn, output and employment have expanded rapidly in high technology industries, which rely heavily on knowledge as a primary input.

The first edition of *British Columbia High Technology Input Indicators: The 1990s* was released in 2000. The purpose of the report was to monitor the high technology sector from the input side, by measuring and analyzing the production and application of knowledge, and the climate, institutions, and funding arrangements that make this knowledge available for the development of the BC high technology sector. The report has been updated annually since then; this is the fourth edition.

This report is intended to complement another annual publication, the *Profile of the British Columbia High Technology Sector*[2],(which focuses on industry outputs (such as GDP, employment, wages, revenues and exports) to give a broader overview of where BC's high technology sector has been and where it might be heading.

Background

While there is obvious value in monitoring the "output" of the high technology sector, informed policy-making requires information about the processes that give rise to that output. In fact, the high technology sector and the surrounding infrastructure are a complex system with many players and interactions. Understanding this system is a matter of identifying the various parts, and collecting information that shows how these parts behave and interact over time. (See APPENDIX I for a more detailed description of the high technology "system". A list of industries that are included in the high tech sector is available in APPENDIX II.)

Information on the high technology system can help shed light on the best ways to foster growth in the sector, including parts of the system that are only indirectly linked to actual production (and often removed from them in time). For example, improvements to the secondary school system may seem very different from output subsidies or tax cuts for high technology firms, but both may have the effect of promoting growth in the high technology

[2]Available at http://www.bcstats.gov.bc.ca

sector over the longer run. Good information provides policy makers with the tools to assess the current situation, as well as an indication of where more effort may be needed to provide an environment in which high technology and other knowledge-based industries, can thrive.

Comparison with Other Jurisdictions

Comparisons to other provinces show the range of what is possible, or what has been achieved in the high technology sector within a Canadian context. This publication focuses on trends in British Columbia as they compare to those in Alberta, Ontario, and Quebec. These four provinces have the largest economies, and the most extensive high technology sectors in Canada. They are referred to as the "high technology provinces" in this report.

It should be noted that the provinces used for comparative purposes vary significantly in terms of high technology growth. For the eleven years leading to 2002, Alberta led the provinces, with employment increasing at an average annual rate of 9.1%. BC (+5.2%), Ontario (+4.0%) and Quebec (+3.3%) posted smaller increases. The national average was 4.4%.

The "Quick Summary" Tables

The thirty-two indicators selected for this publication represent only a fraction of the information base that is available about the high technology sector. However, even this number of indicators measured over time and across provinces poses a challenge to readers looking for an overview of the current situation and an indication of which areas warrant further study. To meet this challenge, this report is first divided according to the four "sectors" outlined in the model diagram (see APPENDIX I). One of the "inputs," labour, is also covered in a separate section. Each of the five resulting sections covers a number of individual indicators. These indicators are listed on the first page of each section, providing a quick summary. The summary makes use of up, down, and horizontal arrows (↑,↓,→) to show whether the indicator has risen, dropped, or remained substantially unchanged. The assessment is made with regard to the trend over the span of time for which the indicator is available, and for the latest period. British Columbia is also to the Canadian average for each indicator.

Since the arrow indicators show only the direction of change, the summary report gives no indication of the size of changes, or their pattern over time. This information is found in the graphs and text included in each section. Data tables for each indicator are located in APPENDIX III.

EDUCATIONAL INDICATORS

The educational sector provides "inputs" to high technology firms in two ways:

1. when individuals acquire skills and knowledge required for product development and production, and
2. during the commercialization of research performed in the educational sector.

The indicators listed below are measures of this dual role. Many are presented on a per capita basis or as a share of gross domestic product (GDP) to allow meaningful comparison with other provinces.

Throughout the 1990s, British Columbia had strong educational attainment in the general population. The data for the last reporting year shows BC continuing to have the highest percentage of the population with a high school education. However, BC lags behind other provinces in the training of new graduates in engineering and computer science. Similarly, the BC ratio of higher education R&D to GDP is low when compared to Canadian standards.

TABLE 2: Quick Summary of Indicators for the Education Sector.

INDICATORS	Trend	Latest year	Relative to other provinces
E-1: High school diplomas per capita	↑	↑	above average
E-2: Post-secondary credentials per capita	↑	↑	below average
E-3: 16 year-old achievement rank: science	↑	↑	above average
E-4: Annual BSc graduates in engineering per capita	↑	↑	below average
E-5: Annual BSc graduates in computer science per capita	↑	↑	below average
E-6: Percentage of households with computers	↑	↑	above average
E-7: Percentage of households using the Internet	↑	↑	above average
E-8: Percentage of small businesses using the Internet	↑	↑	above average
E-9: Gross income per technology license at universities	→	↑	below average
E-10: US patents issued to top two universities	↑	↓	above average
E-11: Higher education performance of R&D to GDP ratio	→	↑	below average

Educational Attainment

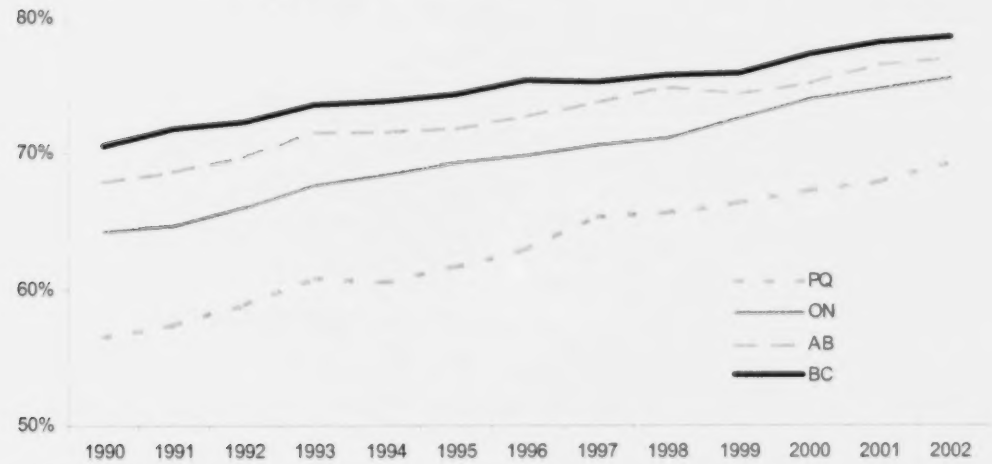
Two indicators of educational attainment – the percentage of the population aged 15 and older with a high school diploma and the percentage with post-secondary credentials – both showed steady increase across Canada throughout the 1990s. At the national level, both indicators continued to edge upwards.

Why are these indicators important?

Higher levels of educational attainment enable high technology firms to draw from a broader, more highly developed skill base.

BC leads the high technology provinces with the highest percentage of its population having a high school diploma (78%). However, the gap between BC and the other high technology provinces has narrowed over the last decade. There was a six-percentage-point gap between British Columbia and Ontario in 1990. Three percentage points separated this province from Alberta. In 2002, the share of the population with a high school diploma was three percentage points higher than in Ontario (75%) and one percentage point higher than in Alberta (77%).

INDICATOR E-1: Percentage of the population 15 years and older with a high school diploma

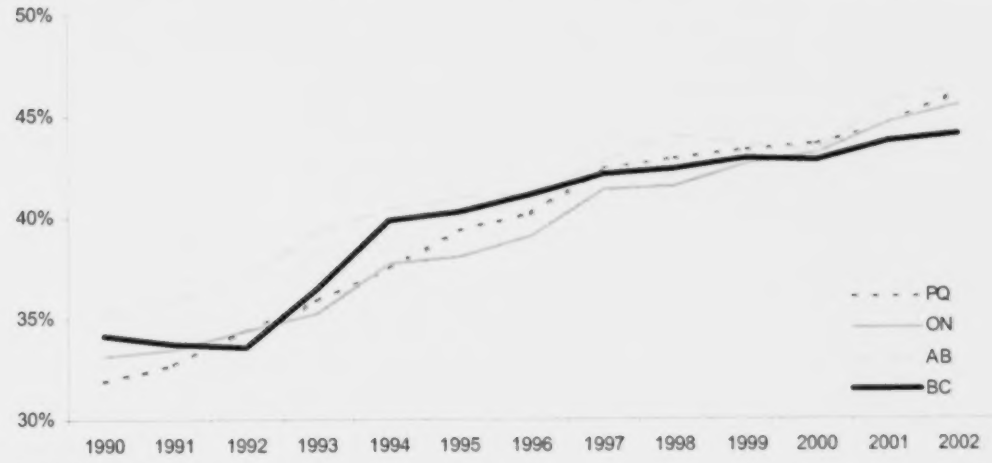


Source: Statistics Canada

Each of the high technology provinces has improved its post-secondary achievement over the past decade, but British Columbia has not done as well as the other provinces. The gap between the four high technology provinces in the percentage of the population with post-secondary credentials is quite small, and has narrowed slightly in the period observed. In almost all years,

Alberta has had the most post-secondary degrees per capita. In 2002, 44% of the adult population in BC had post-secondary degrees, compared with 46% in each of the other three hi-tech provinces.

INDICATOR E-2: Percentage of the population 15 years and older with post-secondary credentials



Source: Statistics Canada

(The measure of the population with post-secondary credentials includes persons who attended a public or private institution after high school and obtained a certificate, diploma or degree. This measure also includes trade and vocational certificates, and apprenticeship programs. People who have enrolled and quit or who have not yet completed a program are not included.)

Achievement on Canadian Standardized Tests

From the inception of the School Achievement Indicators Project, BC consistently ranked in the top six provinces in terms of the percentage of 16-year olds demonstrating excellence on Canada-wide standardized science tests. Alberta ranked consistently in the top.

Why is this indicator important?

Standardized testing in science offers a comparable measure nation-wide for the demonstrated skills and knowledge of students of a given age. Completed tests are graded into five levels of demonstrated competence. The rankings presented here are based on the percentage of students who achieved at level 4 and above (the upper end of achievement). This indicates the percentage with higher than average abilities in science.

The purpose of the science written assessment is to assess students in the following abilities:

- knowledge of the concepts of science,
- understanding of the relationship of science to technology and societal issues,
- conceptual knowledge,
- procedural knowledge, and
- ability to use science to solve problems.

From 1996 to 2000, Alberta ranked first nation-wide in science achievement testing of 16-year-olds. BC jumped from sixth to third place in 2000. Ontario moved up to fifth in 2000, and Quebec also improved in rank significantly, climbing from eighth place in 1996 to second place in 2000.

INDICATOR E-3: Canada-wide rank of 16 year-old achievement in science.

PROVINCE	1996	1999	2000
Alberta	1	1	1
British Columbia	5	6‡	3
Ontario	6†	10	5
Quebec	8	4	2

† tied with Prince Edward Island

‡ tied with Nova Scotia

Source: Council of Ministers of Education, Canada

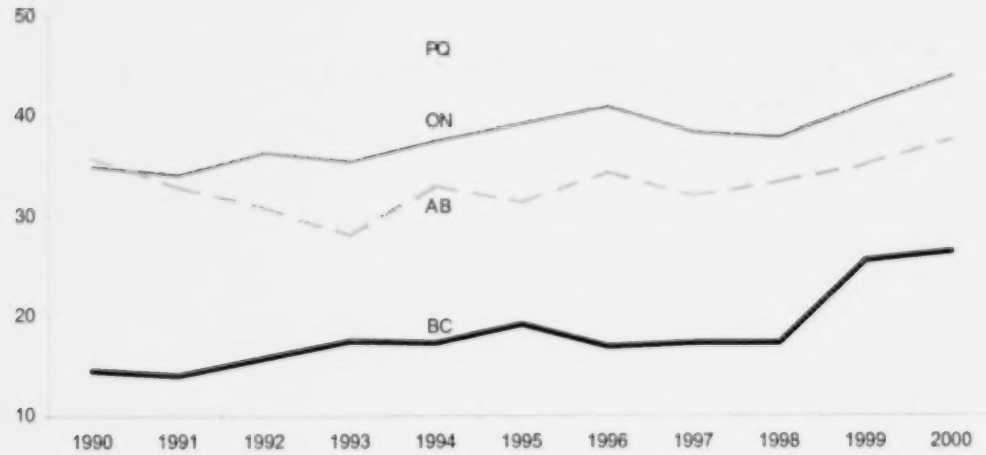
Engineering and Computer Science Degrees

The likely presence of engineers and computer scientists in a high technology economy is indicated by the number of graduates per 100,000 persons aged 15 years and older with bachelors degrees in these respective areas. For these indicators, British Columbia continues to be below the Canadian average.

> ***Why are these indicators important?***
> Engineers and computer scientists are a driving force behind the high technology sector. They provide a highly specialized form of labour that is integral to the development of new or more efficient productive processes.

Between 1990 and 2000, BC graduated far fewer bachelors degrees in Engineering per 100,000 persons than the other leading high technology provinces did. On the positive side, during the last two years (1999-2000), BC's rate of new graduates was boosted by more than 50 percent, while all other high technology provinces saw increases of 12 to 16%.

INDICATOR E-4: Engineering bachelors degrees awarded per 100,000 persons aged 15 years and older



Source: Statistics Canada

The number of BC graduates with a bachelors degree in Computer Science per 100,000 persons remains below the Canadian average. However, the long-term trend of this indicator is positive. The ratio has been rising, and in 2000 BC passed Alberta to rank third among the four high technology provinces.

INDICATOR E-5: Computer Science bachelors degrees awarded per 100,000 persons aged 15 years and older

Source: Statistics Canada

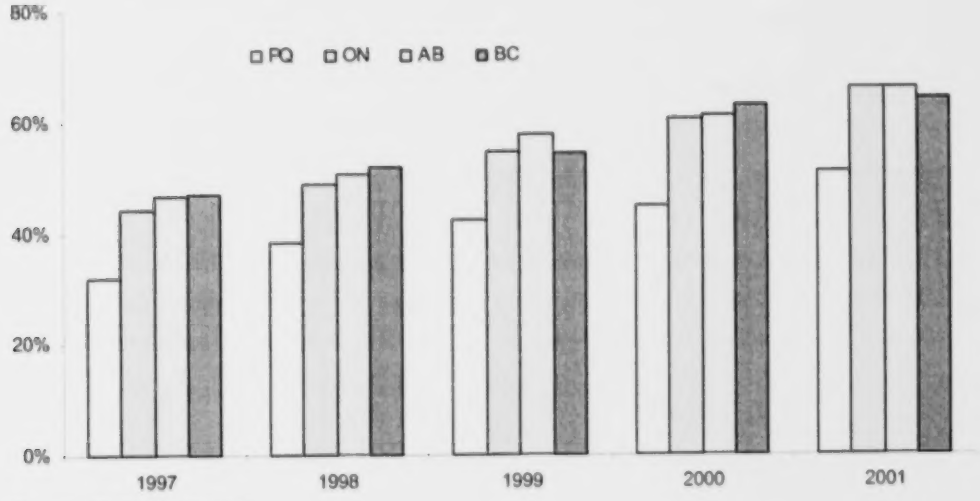
Technology Adoption

Canadians are increasingly making use of new information technologies.

> ***Why are these indicators important?***
>
> High technology businesses are attracted to locations where the population tends toward higher rates of technology adoption. Greater familiarity with technology – for example, computer literacy – is likely to strengthen local market demand for high tech goods and services.

All of the provinces have shown increased use of personal computers by households. In 2001, 64% of BC households had home computers, up from 47% in 1997. The prevalence of home computers was slightly higher in Alberta and Ontario (66% in both provinces in 2001).

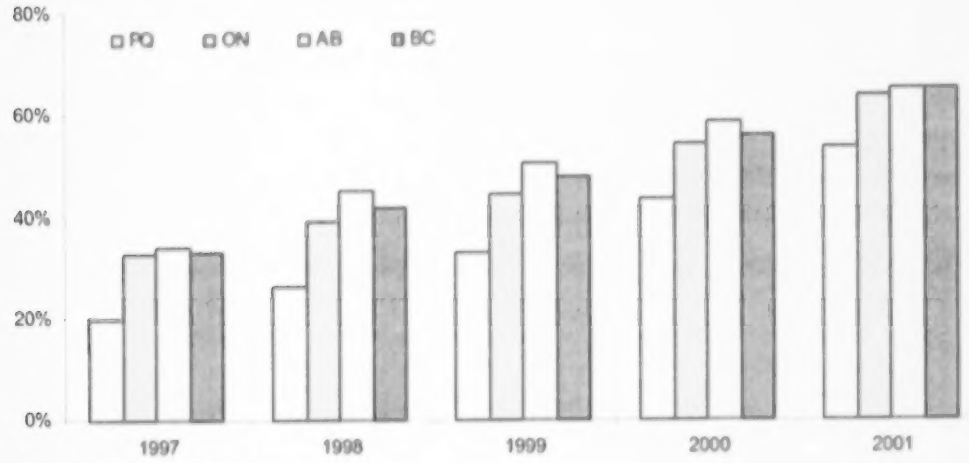
INDICATOR E-6: Percentage of households with home computers



Source: Statistics Canada

For Internet use, 65% of households in both BC and Alberta regularly went online in 2001 – well above the Canadian average of 60%. Over the last several years, Alberta has generally shown the highest household Internet usage. While the percentage of people using the Internet was lowest in Quebec (54%), this province had the highest growth rate for the period.

INDICATOR E-7: Percentage of households using the Internet from any location

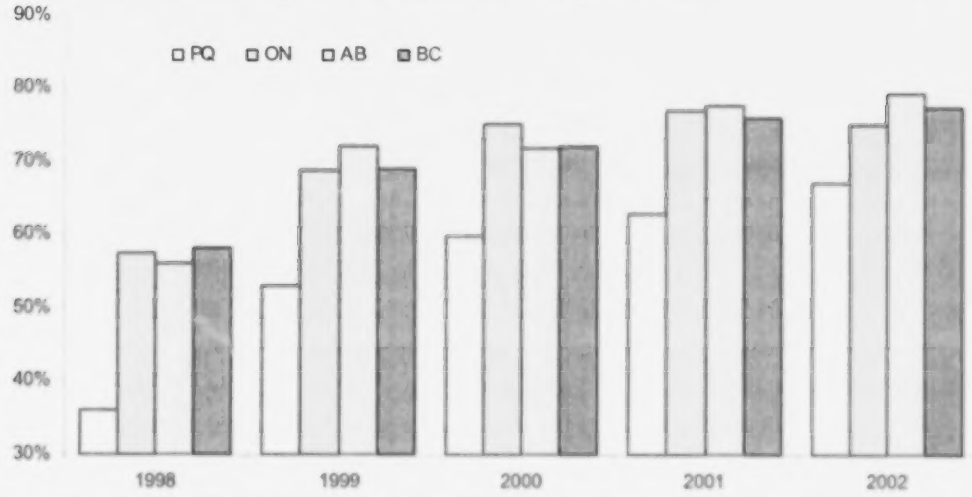


Source: Statistics Canada

(Note that household Internet use – meaning usage by members of households – includes access from home, work, school, libraries and other locations.)

Among small businesses, there has been an upward trend in Internet usage. In BC, the percentage of small businesses using the Internet has risen from 58% in 1998 to 78% in 2002. There has been a similar pattern across provinces, although Quebec lags behind.

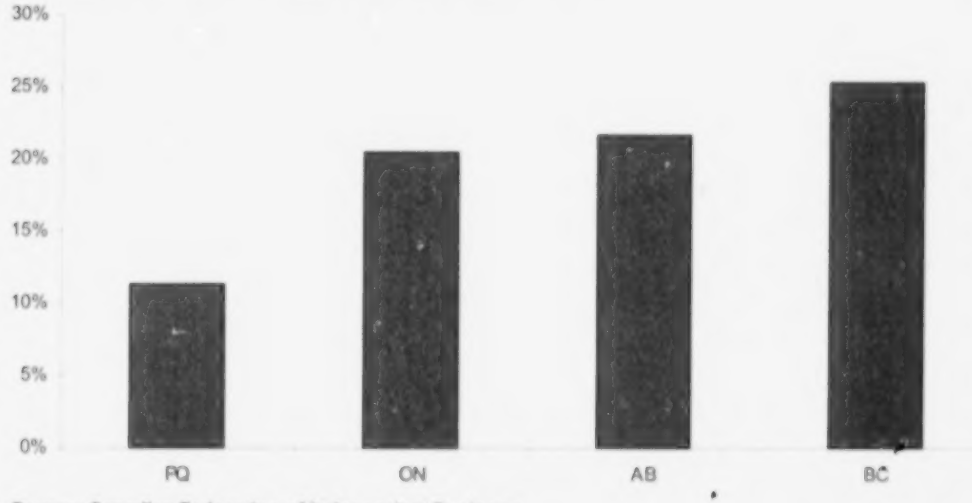
INDICATOR E-8: Percentage of small businesses using the Internet



Source: Canadian Federation of Independant Business

There are greater differences when it comes to more intensive Internet usage by business. BC clearly leads the high tech provinces in terms of maintaining a business website and selling on-line. In 2002, 64% of BC's small businesses had their own website, compared to 59% in Ontario, 56% in Alberta, and 42% in Quebec. Twenty-five percent of BC small businesses were selling their goods or services on-line, a notably higher share than in other regions.

Percentage of small businesses selling on-line (2002)



Source: Canadian Federation of Independant Business

Thus, while general business usage of the Internet is similar across most of the high tech provinces, BC firms seem to be doing more to integrate the technology into their core business strategies.

Technology Licensing[3]

Across Canada, universities began to develop industry liaison offices in the mid-1980s. The University of Toronto office opened in 1980; UBC's University-Industry Liaison Office (UILO) opened in 1985; the University of Alberta office opened in 1987. These offices work with industry to spin-off technology developed at the university into successful companies.

Why are these indicators important?

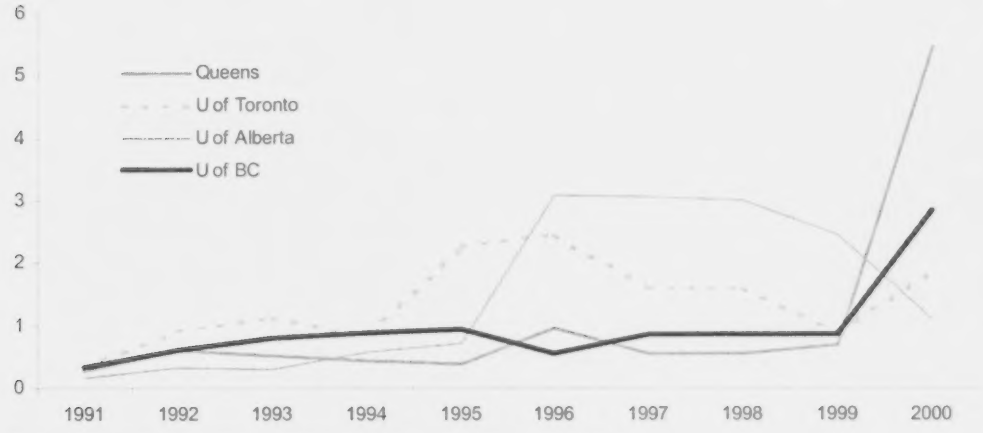
University faculty members are at the forefront of research. One indication of their research productivity is university technology licenses. These licenses allow the institution to 'spin-off' the commercial aspect of the researcher's discovery, which provides income. By looking at the income per license, we get a picture of the commercial success of the research. The number of US patents issued to Canadian institutions is also an important indicator of future revenues.

As a caution, one must keep in mind that a key purpose of universities is to conduct "primary" research – work that does not have any immediate application. This work – when successful – becomes the foundation of further applied research and development. A good example is the Human Genome Project, which recently completed mapping out the entire genetic structure of the human being. Thus, licensing only provides a partial view of the importance of university research in the high tech sector.

During the most recent reporting period, there has been a great deal of shuffling of ranks among the major universities. Queens now leads all other universities with a gross income of nearly $5.5 million from technology licences in 2000. The University of Alberta, which was the leader in 1999, fell to fourth place behind the University of Toronto. UBC saw its income from technology licensing increase by over 200% to $2.8 million, boosting it to 2nd place behind Queens.

[3] Information for technology licensing after 2000 is not yet available.

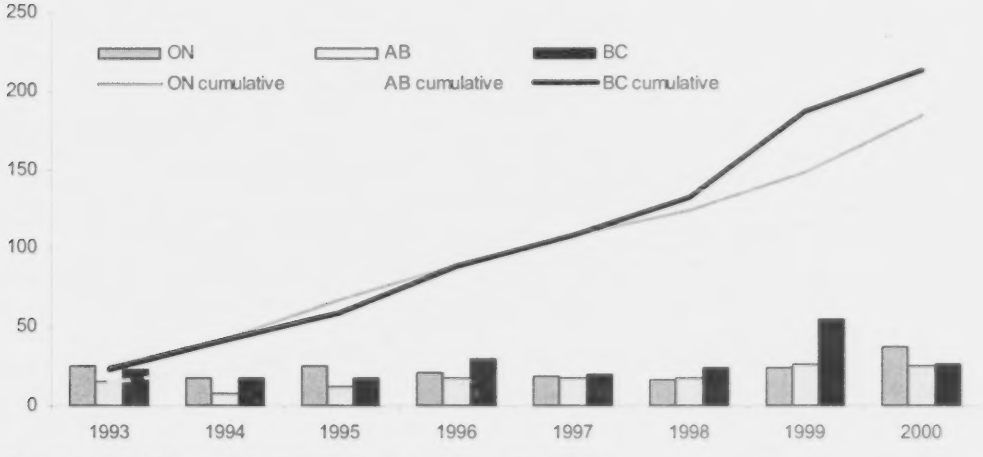
INDICATOR E-9: Gross income from technology licenses (in millions of $US)



Source: Association of University Technology Managers (AUTM)

BC led Alberta and Ontario from 1993 to 1999 in terms of the number of US patents awarded to its top two institutions. Although Ontario universities were awarded more patents in 2000, BC remains on top in terms of the cumulative number of patents. In future years, as these patented discoveries are spun-off, this advantage may translate into higher revenues from technology licenses for BC.

INDICATOR E-10: US patents issued to selected institutions, actual and cumulative[4]



Source: Association of University Technology Managers (AUTM)

[4] Selected Universities include: University of Calgary(Alberta), University of Alberta(Alberta), Queens(Ontario), Waterloo(Ontario), Simon Fraser University(BC), and University of British Columbia(BC)

Performance of R&D by the Higher Education Sector

The higher education sector in Canada performed $5.8 billion worth of R&D in 2000. This amounted to a little more than 0.5% of Canada's GDP in that year. The ratio of R&D performed by the higher education sector to provincial GDP was highest in Quebec at 0.7% in 2000. The ratios were lowest in Alberta and BC (both at 0.4%).

Why is this indicator important?

Research and development at universities contribute to high technology's impact on the economy in two ways. Published academic research is available to the public so that it can be used as a resource, and universities are increasing partnerships with industry to bring the products and processes of R&D to market (see "Technology Licensing"). The ratio of R&D performed by the higher education sector to GDP is an indicator of the proportional investment in R&D by this sector relative to the size of the overall economy.

Between 1992 and 1997, the Canadian ratio of higher education R&D to GDP declined. However, in more recent years this indicator has rebounded to its highest level in at least a decade. Higher education R&D relative to the size of the economy has increased in all the high tech provinces since 1997, although both Quebec and Alberta saw declines in 2000. Alberta now shares with BC the lowest rank in Canada on this indicator.

INDICATOR E-11: Ratio of higher education performance of R&D to GDP

Source: Statistics Canada

EDUCATION SECTOR

BUSINESS INDICATORS

This set of indicators is concerned with the stimulus to business formation and growth that comes from internal R&D, patenting, and venture capital. It also measures results that are in part due to these stimuli, in the form of establishment entries and exits, high growth companies, and the overall growth in the number of establishments.

Compared to other Canadian provinces, British Columbia returns below average ratings in all of the business stimulus indicators. However, some indicators have long-term upward trends. These include venture capital investment and the ratio of business R&D performance to provincial GDP. Although business sector performance of R&D in BC also lagged the Canadian average, it has risen substantially since 1997.

TABLE 3: Quick Summary of Indicators for the Business Sector.

INDICATORS	Trend	Latest year	Relative to other provinces
B-1: Patents per 100,000 persons	↑	↓	below average
B-2: Patents granted as a percent of patent applications	↓	↓	below average
B-3: Number of Entries to the high tech sector	→	↓	n/a
B-4: Number of Exits from the high tech sector	↑	↑	n/a
B-5: Number of high growth companies	→	↓	n/a
B-6: Venture capital investment	↑	↓	below average
B-7: Venture capital investment: share of Canadian total	→	↓	below average
B-8: Business performance of R&D to GDP ratio	↑	↑	below average

Patents and Applications

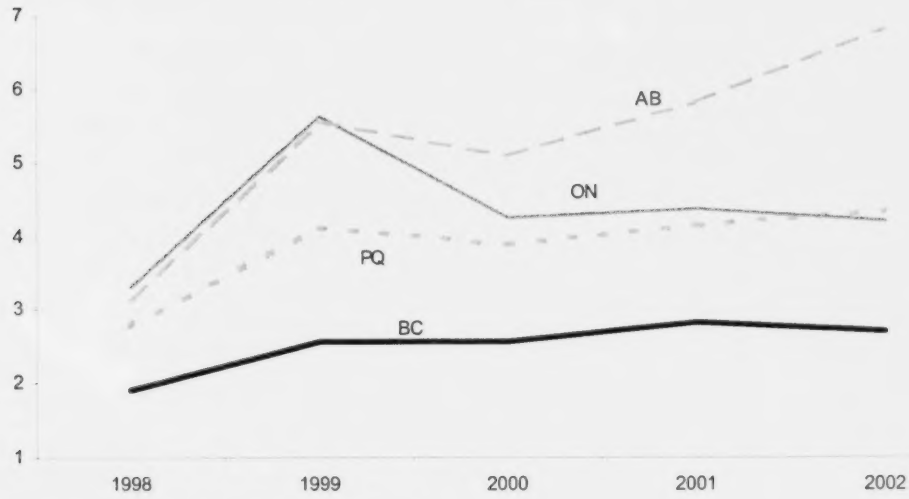
Applications for, and granting of, patents are indicators of the success of R&D, whether in the public or private sector. Over the past five years, British Columbia has consistently lagged the other high technology provinces in terms of patents awarded per 100,000 persons. The acceptance rate of BC patent applications is also below average.

Why are these indicators important?

Patents establish legal property rights for inventions. According to the Canadian Intellectual Property Office, their mandate is to "grant patents which will result in the protection of the inventor and dissemination of technical information, and the encouragement of the creation, adoption, and exploitation of inventions." Patent applications may be rejected for a number of reasons "including lack of novelty, obviousness, and lack of patentable subject matter."

There were 112 patents awarded to BC applicants in 2002—2.7 per 100,000 population. Alberta, with 6.8 patent awards per 100,000 population, easily leads other Canadian provinces. Quebec (4.4) and Ontario (4.2) also have comparatively high patent rates—both roughly 60% higher than in BC. Compared to the other major provinces, British Columbians have not been highly successful in patenting new inventions.

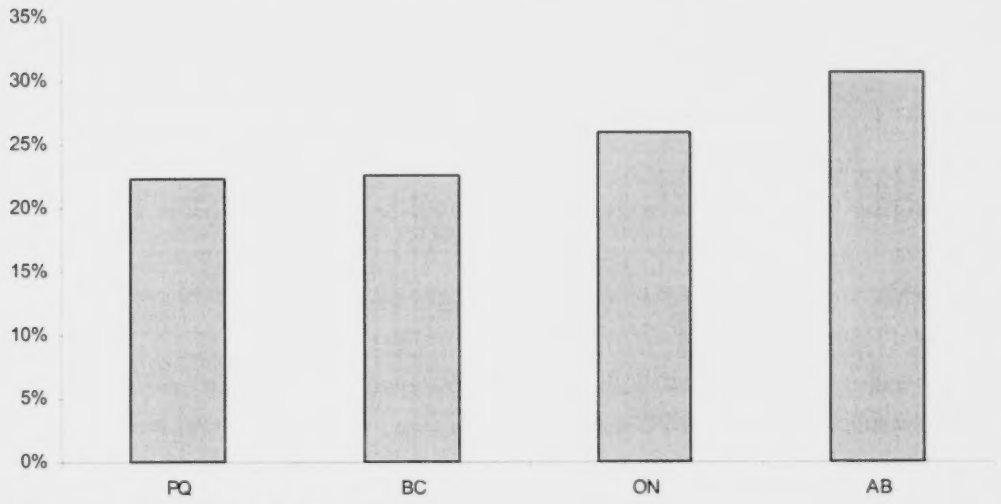
INDICATOR B-1: Patents awarded per 100,000 population



Source: Canadian Intellectual Property Office

Most applications for patent protection are rejected. In BC, only about 23% of applications resulted in the issuing of a patent in the 2000 to 2002 period.[5] This is on par with Quebec (22%), but below Ontario (26%) and Alberta (31%).

INDICATOR B-2: Patents granted as a percent of patent applications (three-year average, 2000-2002)



Source: Canadian Intellectual Property Office

The low acceptance rates across the country suggest that many – or even most – applicants begin the process with little knowledge of their chances of success. This pattern seems somewhat more common in BC.

[5] Patent applications take an average of 25 months to be processed. Thus, to know how many applications filed in 1998 were accepted, one must look at patents granted in 2000. Figures presented here show patent grants during 2000-2002 as a percent of applications during 1998-2000.

Sector Dynamism: Entries and Exits

An indicator of the vibrancy of the innovation economy is the number of entries to and exits from the high technology sector. The sector seems to embrace a relatively strong entrepreneurial spirit. One consequence of this, of course, is a high rate of business failures. However, small start-up firms in high tech are often at the leading edge of innovation, and seem crucial to the ongoing strength of the sector.

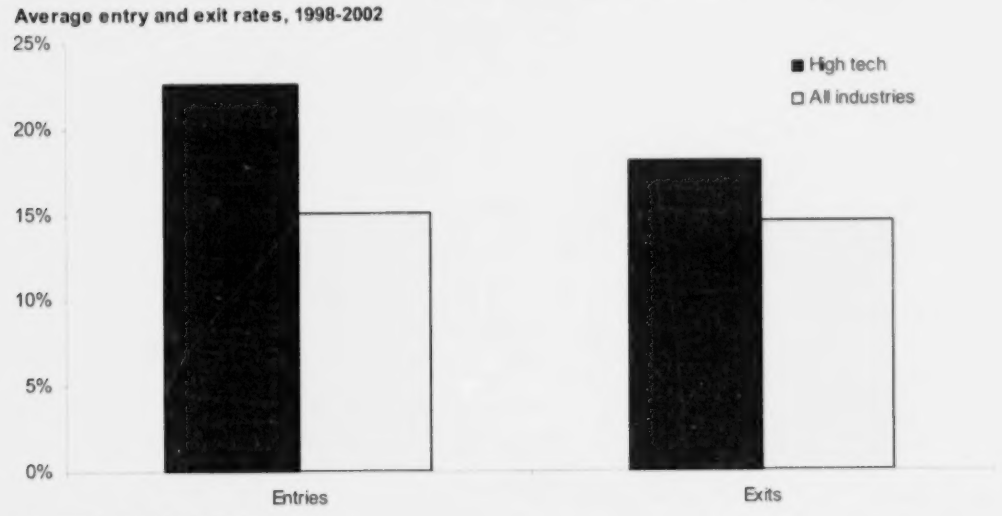
Why are these indicators important?

A dynamic sector, characterized by a healthy mixture of large and small, old and new firms, is ideal for generating high levels of innovation. Large, established firms provide employment and earnings stability while small start-ups provide market responsiveness and creativity.

High tech sector entry rates indicate the percentage of firms currently in the sector that are new (i.e. did not exist in the previous year). Similarly, exit rates show how many firms left the high tech sector (or went out of business) as a percentage of the total number of high tech firms. Note that only companies with employees are included in these data.

Entrepreneurialism is a characteristic of the high tech sector. For the BC economy as a whole, the entry rates of new firms into the market averaged 15.1% over 1998 to 2002. In the high tech sector, the entry rates were a full 50% higher (22.6%). However, exit rates in high tech (18.1%) are also significantly higher than average (14.5%).

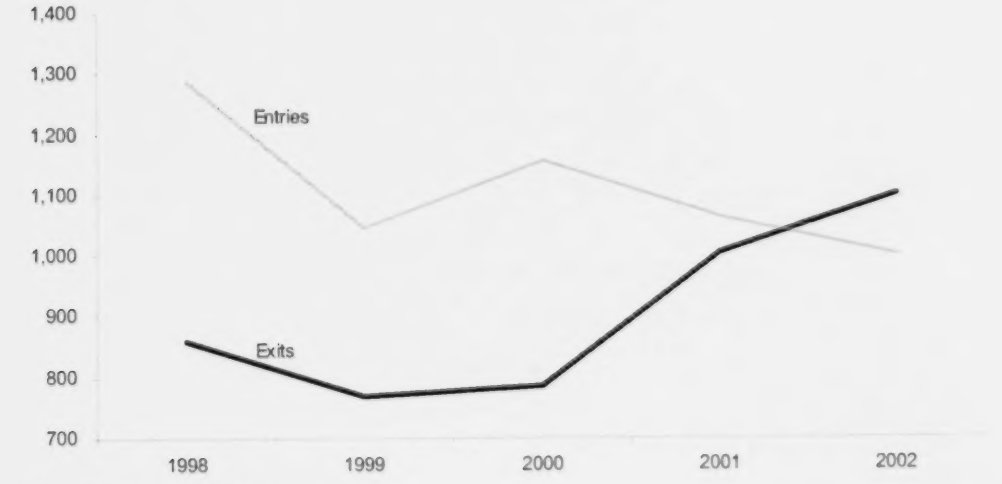
INDICATOR B-3: Entry and exit rates are higher than average in the high tech sector



Source: Statistics Canada

Over the last five years, the number of entries into the high tech sector has been declining, while exits have grown more frequent. By 2002, exits outweighed entries, and the number of firms in the sector declined for the first time in at least five years - a strong indication that the sector is struggling.

INDICATOR B-4: Exits begin to outpace entries in the high tech sector



Source: Statistics Canada

High Growth Companies

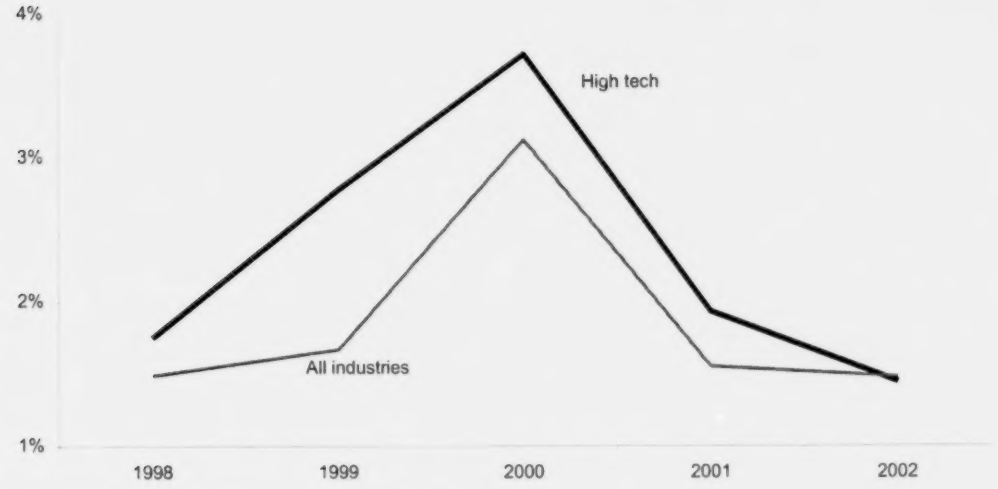
The high technology sector is often thought to be a breeding ground for rapid growth firms—small start-up companies that grow by leaps and bounds. Few firms qualify as "high growth," but they are relatively more common in the high tech sector than elsewhere.

The indicator explained...

BC Stats defines "high growth companies" as those which increase by at least two employment size categories in one year. For example, a firm that has one to four employees would be considered "high growth" if it expanded to have 10 to 19 employees. Similarly, a company with 100-149 workers expanding to 200-249 workers would also be considered high growth. There are 21 employment size categories, which provide a considerable amount of detail. However, it should be cautioned that because the exact number of workers in a firm is not known, this measure will be somewhat imprecise. Further, because the last employment category is "5,000 and over," it is impossible for a large corporation to be classified as "high growth." These data, then, principally apply to small and medium-sized establishments.

In 2002, only 1.5% of companies in BC showed rapid growth in employees, and the same was true for BC high tech firms. However, the high tech sector does, in general, have relatively more firms with rapid employment growth. Between 1998 and 2002, 1.9% of BC firms were "high growth companies", compared to 2.4% of BC high tech firms.

INDICATOR B-5: "High Growth" companies as a percentage of all firms, 1998-2002



Source: Statistics Canada, Prepared by BC STATS

Venture Capital Investment

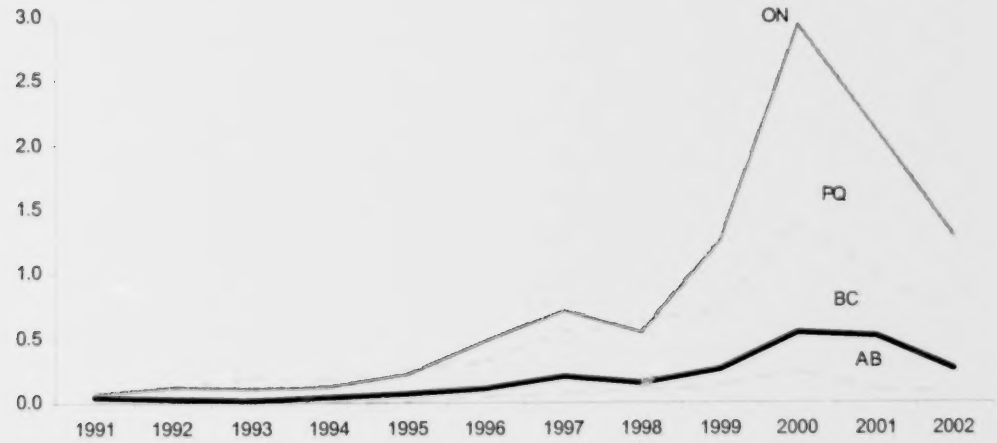
Canadian venture capital investment exploded during the 1990s, rising from a modest $270 million in 1991 to nearly $5.3 billion in 2000 (nearly 20 times greater than in 1991). Since then, investment has plummeted, dropping by more than half (-54%), to $2.5 billion, over two years.

Why are these indicators important?

Venture capitalists specialize at investing in high-risk company start-ups or expansions. They provide the seed funds for projects that are more often than not involved in the development of a new untested product or process. Most venture money is lost when the product or service is not viable to the market, but companies that do succeed often have a very large payback. In this way, venture capital investment by province gives an indication of both the quality of ventures in a given province as well as the venture capitalists' assessment of the business climate. It also, of course, reflects the risk tolerance of investors in different regions and over time.

The boom and bust of venture capital investment has largely been a central Canadian phenomenon, with Ontario and Quebec accounting for 79% of Canadian venture capital (over the period 1991-2002). At the peak of the boom, BC attracted $540 million in venture capital investment, compared to $2.9 billion in Ontario.

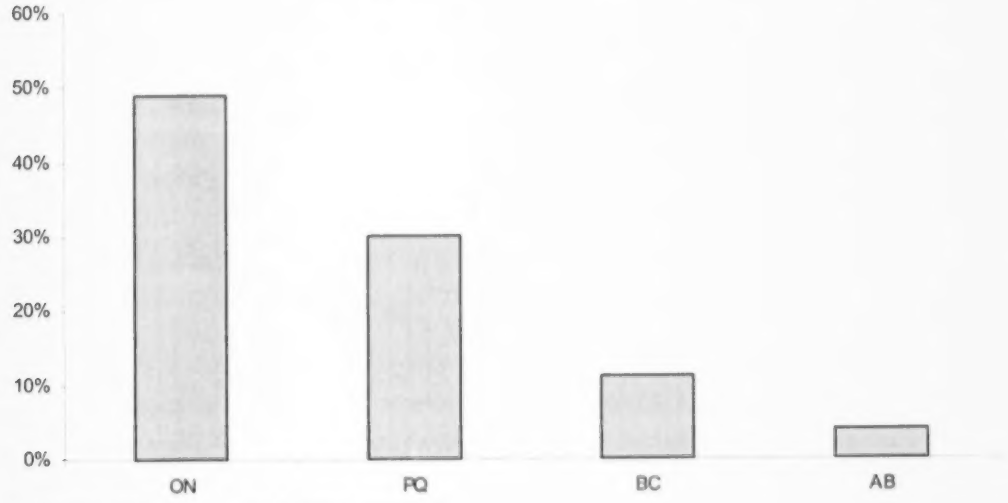
INDICATOR B-6: Canadian venture capital investment by province of investment ($ billion)



Source: Canadian Venture Capital Association

British Columbia has at least been noticed by venture capitalists. BC's 11% share of venture capital investment is far greater than in any other province outside Canada's industrial core. Indeed, the amount of investment in BC over the last dozen years ($2.2 billion) exceeds that of Alberta, Saskatchewan, Manitoba, and the Atlantic provinces combined ($1.9 billion).

INDICATOR B-7: Proportional share of Canadian venture capital investment, 1991-2002



Source: Canadian Venture Capital Association

Performance of R&D by the Business Sector

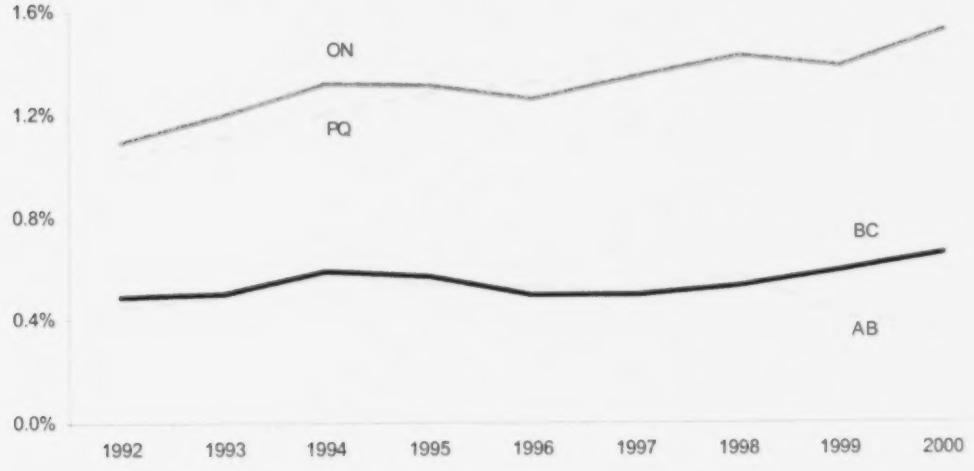
In 2000, the business sector in Canada performed $11.5 billion worth of R&D, amounting to just over 1% of Canada's GDP in that year. Throughout the 1990s, the ratio of business R&D to provincial GDP was much higher in Quebec and Ontario than in BC and Alberta. In 2000, the ratio increased in BC and Ontario, and fell in Quebec and Alberta.

Why is this indicator important?

Research and Development (R&D) provides the potential for innovation and new discoveries either in the form of a new product, a service or a process that eventually enhances productivity. In this way, R&D is viewed as an investment in future output. The ratio of R&D performed by business to GDP is an indicator of the proportional investment in R&D by the business sector relative to the size of the overall economy.

Ontario and Quebec alone made up 85% of business R&D in Canada in 2000 (BC accounted for 7%). The ratio of business R&D to GDP in Quebec and Ontario is more than twice that in BC. In recent years, business R&D has seriously lagged in Alberta, and that province has fallen well behind BC.

INDICATOR B-8: Ratio of business performance of R&D to GDP



Source: Statistics Canada

GOVERNMENT INDICATORS

The government sector affects high technology firms by providing a regulatory, tax, and infrastructure environment for the private sector to operate within. Government also funds and performs a substantial amount of research and development.

The tax regime is similar across provinces. Quebec has a considerably lower corporate income tax rate than other provinces, while British Columbia and New Brunswick have the lowest small business tax rate.

This section also includes a summary of gross expenditures on R&D in British Columbia. This includes R&D performed by business, higher education, and federal and provincial governments. Direct performance of R&D by government has lagged in BC compared to other provinces.

TABLE 4: Quick Summary of Indicators for the Government Sector.

INDICATORS	Trend	Latest year	Relative to other provinces
G-1: Personal tax index for $80,000 income	↓	↓	below average
G-2: Small business tax rate	↓	→	below average
G-3: Corporate income tax rate	↓	→	above average
G-4: Government performance of R&D to GDP ratio	→	→	below average
G-5: Gross expenditure on R&D (GERD) to GDP ratio	→	↑	below average

Tax Rates: Individual and Corporate

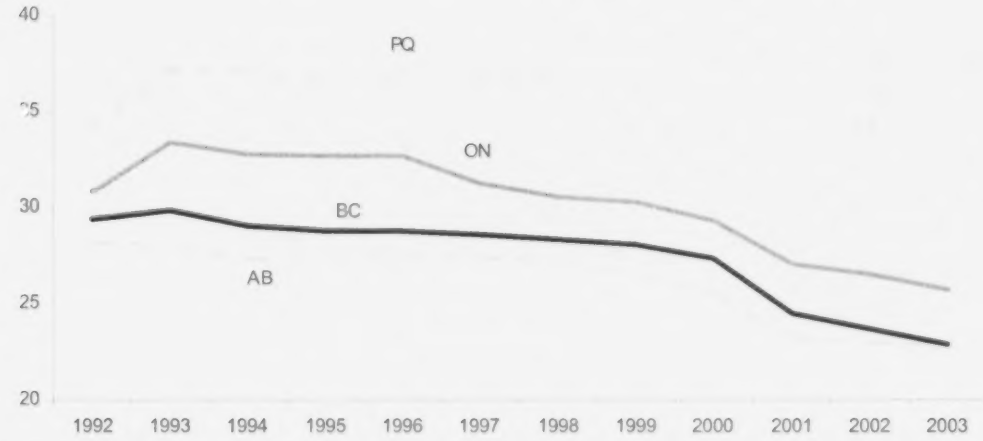
Tax rates are one significant policy area over which the government has complete control.

Why are these indicators important?

Lower levels of taxation can be tools to attract investment and a skilled workforce—both essential to the high technology sector. However, a better quality of life associated with environmental protection and broad social programs (education, health care, and social services) is also thought to be attractive to high technology workers. These amenities result in higher levels of taxation.

The total taxes levied on a single (unattached) individual earning $80,000 a year in BC averaged $22,892 in 2003—the lowest level in Canada (note that this includes all federal and provincial taxes, such as the GST, health care premiums, income tax, etc.). Indeed, the level of taxation in BC for high-income individuals has declined considerably since 1993 (when taxes amounted to $29,796). Personal taxes on high-income earners, which fell substantially in 2000, continue to drop in all four provinces. Average taxes paid by high-income earners in BC remain well below those in Quebec ($33,147) and Ontario ($25,688). Taxes paid in Alberta ($22,895) are virtually the same as in BC.

INDICATOR G-1: All taxes paid by unattached individuals earning $80,000 per year ($ '000)

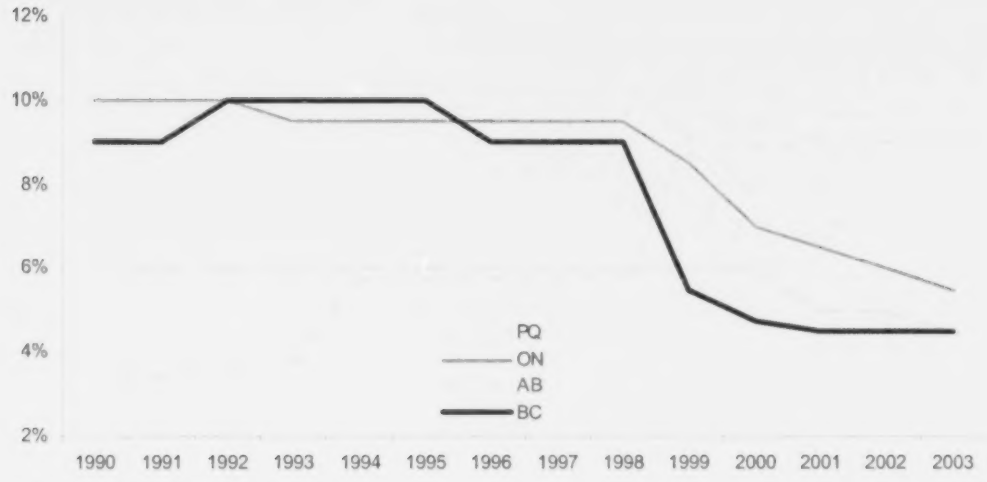


Source: BC Ministry of Finance & Corporate Relations

BC's small business tax rate rose in 1992, then declined in 1996 and 1999 through 2001, giving the province the lowest small business tax rate (4.5%) of the high technology provinces. In 2003, Alberta lowered its small business rate 0.5 percentage points to match the BC rate. Quebec's tax

rate increased in 1999 (to 9.0%) and is now double the rate in BC. (Quebec no longer has a different tax rate for small business.)

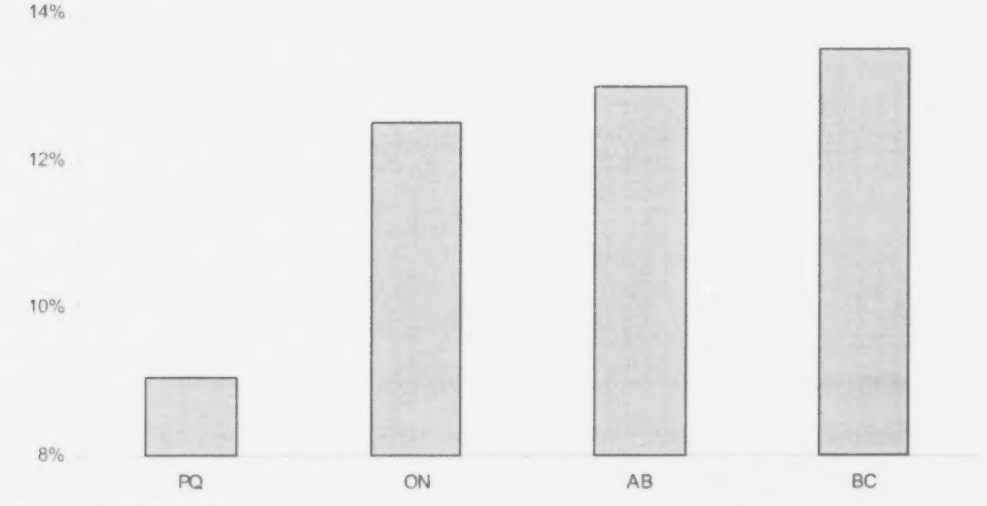
INDICATOR G-2: Small business tax rate



Source: BC Ministry of Finance

In contrast to the small business rate, BC's general corporate income tax rate (13.5%) is the highest among the high tech provinces. Quebec stands out for having a low corporate income tax rate (9.0%), but the difference between BC and Ontario (12.5%) or Alberta (13.0%) is marginal.

INDICATOR G-3: General corporate income tax rate in 2003



Source: BC Ministry of Finance

Performance of R&D by the Government Sector

Overall, the government sector in Canada performed $2.34 billion worth of R&D in 2000, posting the fourth annual increase since 1997. This amounted to 0.2% of Canada's GDP.

Why is this indicator important?

Government tends to fund much more R&D than it actually performs. However, in some fields, governments do maintain research personnel in order to provide independent testing of products, processes and practices. The purpose of most internal government research is not necessarily focused on innovation, but serves a review function. Significant innovations developed by government researchers are often spun-off to the private sector.

Within the high technology provinces, Ontario has maintained the highest ratio of government R&D to GDP. BC's ratio has historically ranked last compared to all provinces, while Alberta has held the 9th place rank. However, the government R&D ratio in British Columbia has begun to increase. The BC ratio was half of the Canadian average in 2000. The ratio for Quebec increased, while Alberta's ratio declined in 2000.

INDICATOR G-4: Ratio of combined federal and provincial performance of R&D to GDP

Source: Statistics Canada

Gross Expenditure on R&D

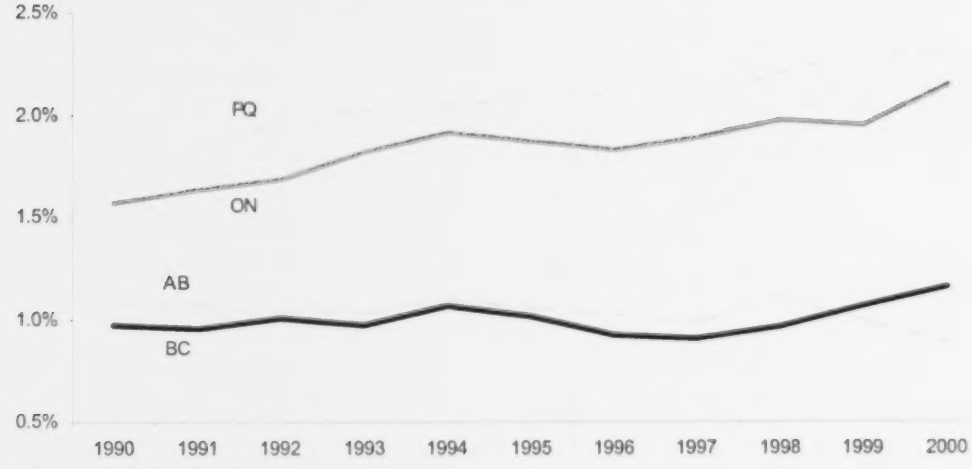
Gross Canadian expenditure on research and development (GERD) reached $19.6 billion in 2000, amounting to 1.8% of Canada's GDP in that year. Across Canada, the GERD to GDP ratio has been rising since 1996 and reached a new high in 2000.

Why is this indicator important?

The overall ratio of total R&D effort to the overall economy, also known as the GERD ratio, is a measure of how much a jurisdiction is willing to sacrifice current consumption for potential increased future capacity. The changing structure of the ratio (the relative size of the component investments by the government, business and higher education sectors) over time is a measure of the shifting importance different sectors place on the performance of R&D. Although the meaningfulness of the GERD ratio has been challenged in recent times, the measurement of R&D effort as an indicator for the high technology sector remains a primary objective of national statistical agencies.

GERD ratios for Quebec and Ontario are the highest in the country, and have increased substantially since 1990. Ratios for BC and Alberta have hovered at approximately 1.0% of GDP during the same period. By 2000, Alberta's ratio fell to 0.9%, while BC's rose to 1.2%.

INDICATOR G-5: Ratio of total expenditure on R&D to GDP

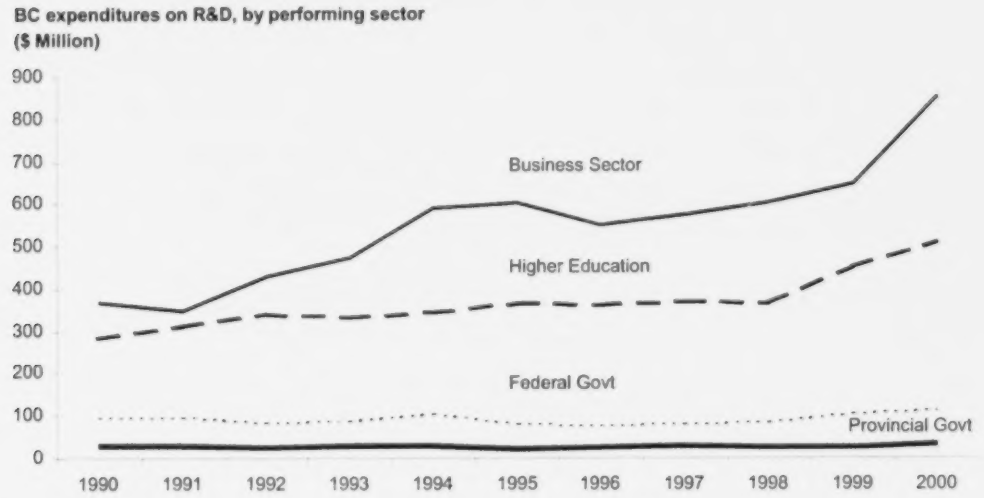


Source: Statistics Canada

GOVERNMENT SECTOR

The business sector in BC performed the bulk of R&D (57%) in 2000. Higher education made up about a third (34%), while the rest (9%) was done by the federal and provincial governments. Over the last decade, the amount of R&D performed by government has held steady, while R&D in business and higher education has been increasing.

Business sector the leading performer of R&D



The business sector performs more R&D than it funds. In 2000, BC businesses performed 57% of R&D but funded only 49%. Similarly, the provincial and federal governments have a much more direct role in funding – as opposed to performing – R&D, providing 22% of total financing in 2000.

EXTERNAL INDICATORS

The British Columbia economy is highly dependent on trade with other provinces and foreign countries both as a source of goods and services used in BC and as markets for its products. Trade relationships play an integral role in the high tech sector, as they do in the economy as a whole. BC imports of high technology goods – which can be an indicator of future production since imported components are often used to produce high tech products – increased steadily throughout the period examined, before falling for the first time in 2002.

Immigrants to Canada are increasingly well-trained and educated. BC is more or less on par with other provinces in terms of attracting skilled foreigners. In-migration from other provinces has also boosted the province's supply of well-trained, educated workers, but in recent years the flow has reverse, with the province losing people to other parts of Canada.

TABLE 5: Quick Summary of Indicators for the External Sector.

INDICATORS	Trend	Latest year	Relative to other provinces
X-1: Percentage of immigrants with higher education	↑	↓	below average
X-2: Median years of schooling of immigrants	↑	→	average
X-3: Net inter-provincial migration	↓	↑	below average
X-4: High technology imports	↑	↓	n/a

Educational Background of Immigrants

British Columbia experienced high levels of immigration in the 1990s, and this trend continued in 2001. Overall, immigrants to BC tend to be well educated. The median education level of adult immigrants (aged 25 years and older at landing) is 15.0 years of schooling. This is on par with Alberta (15.0 years of schooling) and similar to that in Ontario (15.3) or Quebec (15.6).

Why are these indicators important?

The economic effects of immigration depend on the skills and resources immigrants bring with them. An influx of highly educated immigrants—an increase in the supply of skilled labour—can provide a significant boost to high technology companies. Immigrants also offset the loss of skilled workers who move to other provinces or out of Canada.

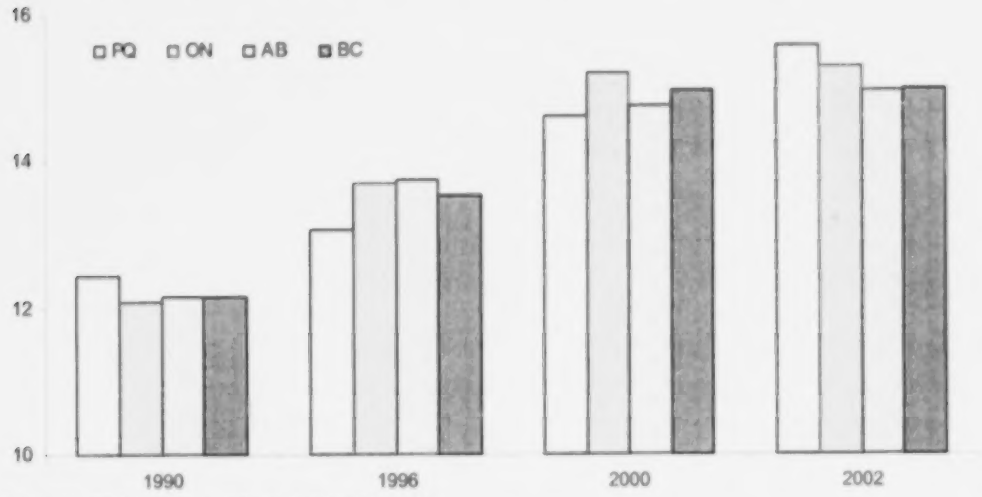
The number of skilled immigrants to BC has increased substantially (+150%) since 1990. Only Ontario has seen higher growth (+177%), and Quebec (+96%) and Alberta (+57%) lag well behind. Indeed, BC has been a central destination for skilled immigrants. Over the whole period of 1990 to 2002, BC received over 100,000 immigrants with 16 or more years of education—more than any other province except Ontario.

INDICATOR X-1: Adult immigrants to BC with 16 or more years of schooling at time of landing

Source: Citizenship and Immigration Canada

The median years of schooling of immigrants aged 25 years and older increased through the 1990s. In BC, median education rose from 12.2 years to 15.0 years between 1990 and 2002. Other provinces have seen the same trend.

INDICATOR X-2: Median years of schooling of immigrants 25 years and older



Source: Citizenship and Immigration Canada

It seems clear that Canada "imports" high-technology workers. Recent immigrants are more likely to be working in natural and applied sciences occupations than Canadian-born workers. For men, 12% of recent immigrants were employed in this field in 1996, compared to 9% of Canadian-born workers. For women, the same pattern holds (4% of recent immigrants and 2% of Canadian-born individuals work in natural and applied sciences).[6] However, nearly a quarter of recent immigrants with a university degree were working in sales and service occupations. This suggests that Canada is still not fully taking advantage of the high educational attainment of its immigrants.

[6] Badets, Jane and Linda Howatson-Leo. "Recent Immigrants in the Workforce." *Canadian Social Trends*. Spring 1999, Statistics Canada Catalogue 11-008.

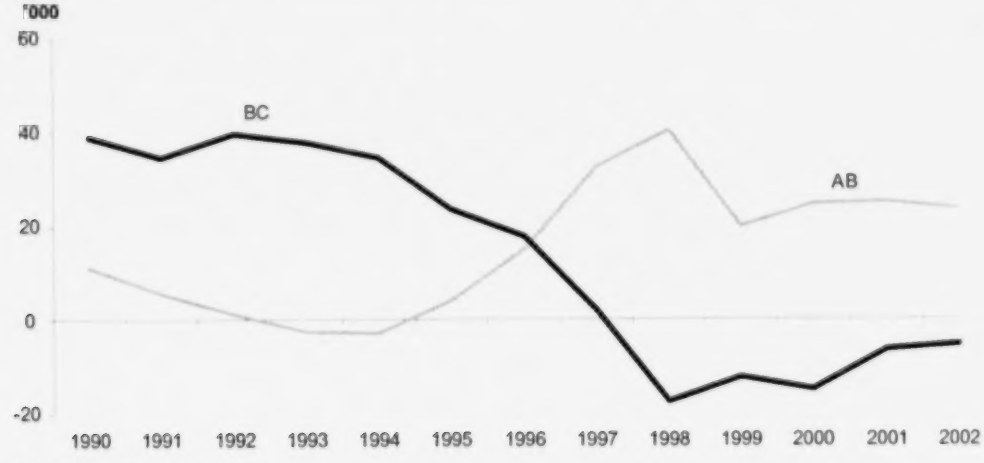
Inter-provincial Migration

People seeking better economic opportunities contribute significantly to the pattern of inter-provincial migration in Canada.

> ***Why is this indicator important?***
> Workers in Canada have much greater freedom to move within the borders of the country than between countries. In aggregate, population movement between provinces is a general indicator of perceived economic opportunity and general attractiveness.

Net migration to BC peaked in 1992, with a net inflow of nearly 40,000 people. 1994 marked the beginning of a steep downward slide and by 1998 there was a net outflow of over 17,000 individuals. Parallel to this was a soaring increase in migration to Alberta. Indeed, the migration patterns of these two provinces have been almost mirror images over the last decade. Out-migration from BC has gradually eased since 1998, but the province is certainly not the destination of choice that it once was.

INDICATOR X-3: Net inter-provincial migration



Source: BC STATS

Quebec has seen consistent net out-migration over the period. In Ontario, population outflows in the early 1990s were reversed in 1997, and in 2000 there were more than 23,000 net migrants to the province. However, by 2002 net migration to Ontario had dropped to 6,500.

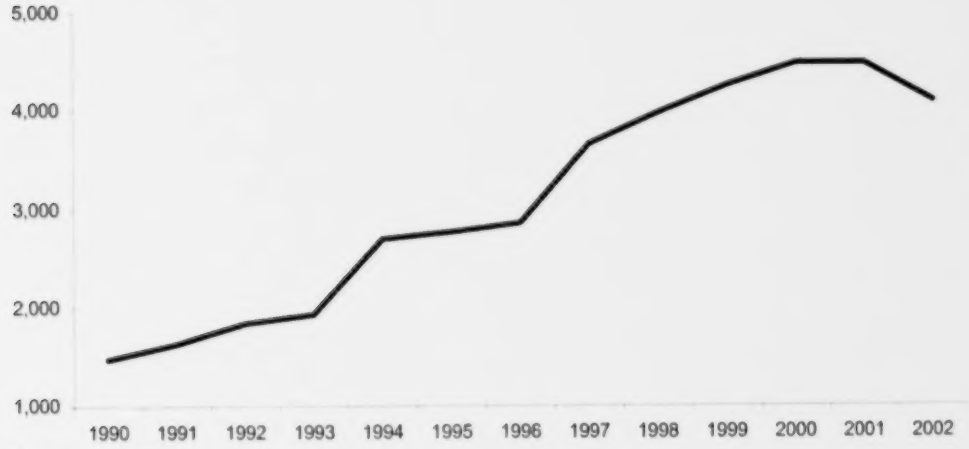
High Technology Imports

BC's high technology sector relies on imports of high technology goods in order to thrive.

> ***Why is this indicator important?***
>
> Although a heavy reliance on imports can create a negative trade balance (the difference between the value of goods exported and the value imported), imports of high technology goods are often essential because they can be turned into future exports. For instance, without state-of-the-art telecommunications, the high technology sector as a whole would struggle. Similarly, purchases of computer integrated manufacturing technology would displace future imports of other goods, whether high technology or low technology, and could generate goods for export.

Computers and telecommunications are the main component (53%) of high technology imports. Aerospace (19%) and life sciences (13%) also make up notable shares. Imports of high technology goods increased steadily between 1991 and 2000, but have declined over the last two years. Note, however, that imports have not been adjusted for inflation or exchange rate effects.

INDICATOR X-4: Value of high technology imports to BC ($ Million)



Source: BC STATS

LABOUR INDICATORS

Most of the indicators in this report are grouped according to the sector that provides or affects the input. However, in the case of labour input, indicators such as the unemployment rate are not attributable to a single source sector. This section contains a set of indicators that are specific to the labour market but represent a combined impact of the source sectors.

Unemployment rates among workers in the natural and applied sciences are well under those in the economy overall. Further, these unemployment rates have been falling quite consistently since the early 1990s, but they bounced back in the last two reporting years (2001-02).

TABLE 6: Quick Summary of Indicators for Labour.

INDICATORS	Trend	Latest year	Relative to other provinces
L-1: Unemployment rate for natural and applied sciences	↓	↑	above average
L-2: Research personnel per 100,000 population	n/a	↓	below average
L-3: Quality of life	n/a	↓	above average
L-4: Cost of Living	n/a	↑	above average

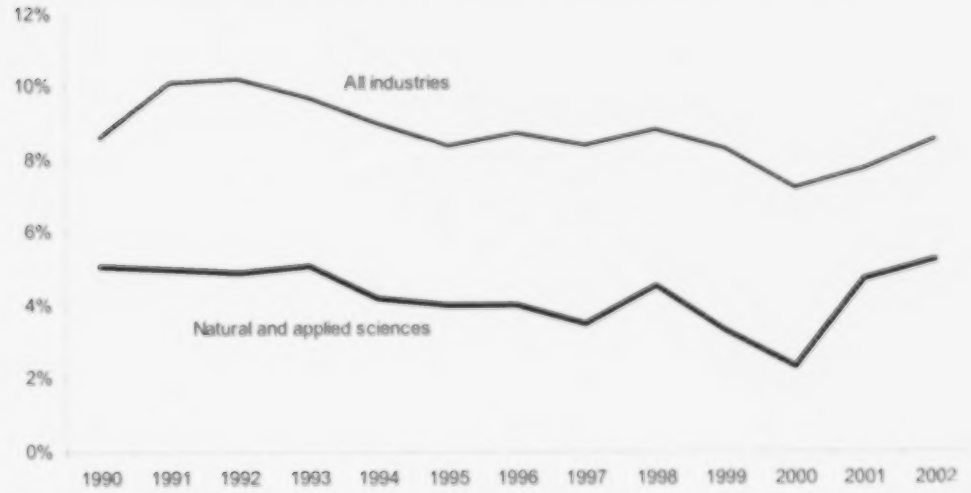
Unemployment Rate in Natural and Applied Sciences

Nationally, the highest unemployment rate for all occupations was 11.4% in 1993. The highest rate of unemployment for natural and applied sciences was 5.9% in the same year. Throughout the 1990s, persons employed in the natural and applied sciences occupations have enjoyed an employment advantage compared to the entire labour force.

Why are these indicators important?

A low level of unemployment in natural and applied sciences occupations is desirable because some components of this group (e.g. computer scientists) are the engines of innovation in the high technology economy. Higher levels of unemployment in this group indicate idle intellectual capital, which has the effect of slowing the overall rate of innovation. Also, a lower ratio between the unemployment rate for natural and applied science occupations and the overall labour force indicates heightened demand for these specializations. This should attract more workers—and students—into this sector of the job market.

INDICATOR L-1: BC unemployment rate for natural and applied science occupations

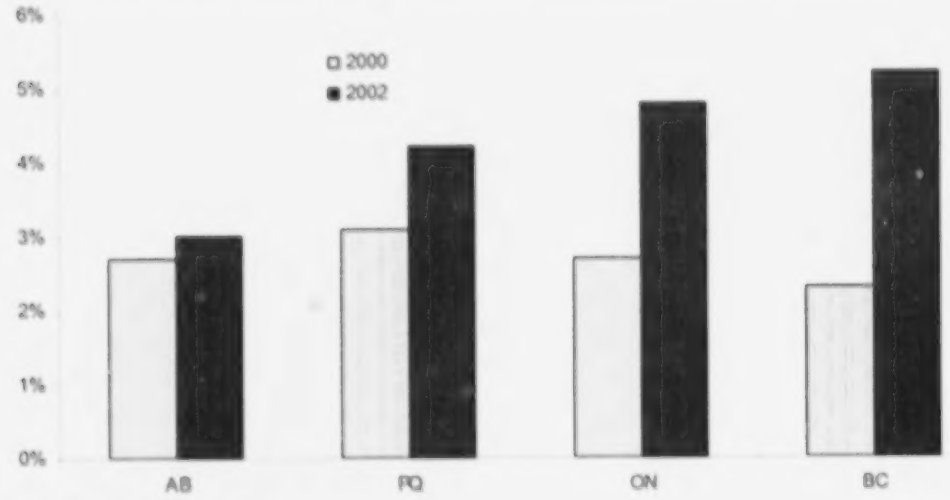


Source: Statistics Canada

In 2000, the unemployment rate for natural and applied sciences in BC reached a decade low of 2.3%. Over the last two years, however, the high tech unemployment rate has more than doubled to 5.2%. Some 5,600 high tech jobs have disappeared. High tech unemployment has

increased in all four provinces, though nowhere as sharply as in BC. Since 2000 BC has changed from having the lowest to the highest high tech unemployment rate among the four provinces. If this development persists, BC will likely suffer from "brain drain" in coming years.

Unemployment rate for natural and applied science occupations is now highest in BC



Source: Statistics Canada

Research Personnel[7]

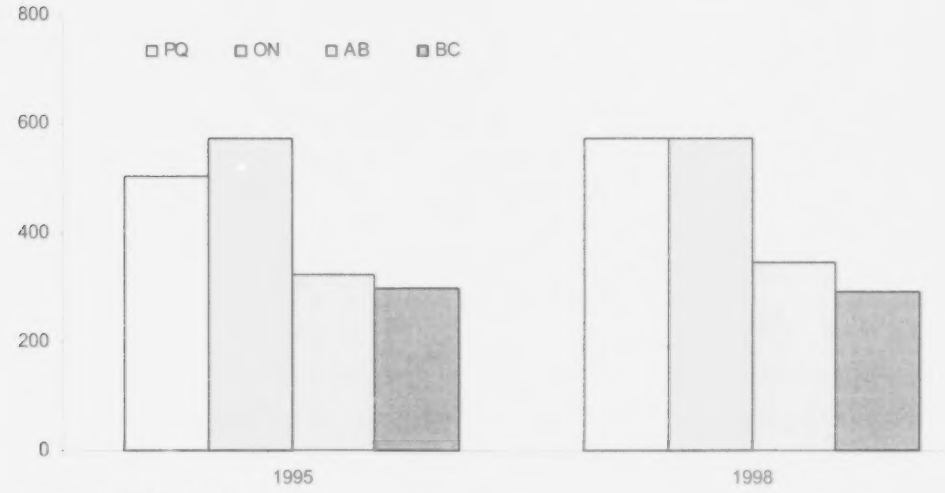
In 1998, there were approximately 463 researchers per 100,000 persons, working in the areas of government, business and higher education across Canada. Business and higher education claimed the largest shares of Canadian research personnel (55% and 32%, respectively).

Why is this indicator important?

The absolute number of researchers and technicians engaged in research is an important determinant of the volume of scientific and technical discoveries that may result in patent applications, and later, in the birth of new firms or the growth of existing firms. The structure of the research workforce is also important. Each sector (federal government, provincial government, business enterprise or higher education) has different reasons for developing new technology and different methods of bringing new discoveries to market.

British Columbia's workforce of researchers and technicians was the fourth largest per 100,000 persons across Canada in 1998, up from an eighth place rank in 1995. While the number of researchers in BC increased only slightly in 1998, total number of researchers in the several other provinces decreased. Ontario has the largest research workforce per 100,000 and in absolute numbers, followed by Quebec.

INDICATOR L-2: Total research workforce per 100,000 persons

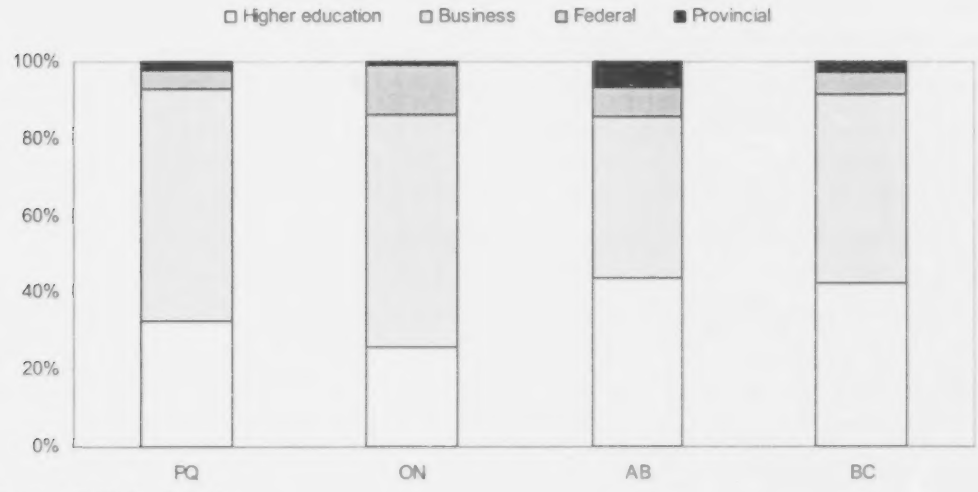


Source: Statistics Canada

[7] Information for research personnel after 1998 is not available.

Although business accounts for the largest proportion of the research workforce in each high technology province, the proportions range from 42% of personnel in Alberta to 61% in Ontario in 1998. Ontario has the largest portion of federal research personnel due to the concentration of federal agencies in the National Capital Region (Ottawa). Alberta's provincial government researcher workforce is more than double the Canadian average. BC's research workforces were all below the Canadian average in 1998.

FIGURE 2: Structure of the research workforce by sector in 1998



Source: Statistics Canada

Quality of Life

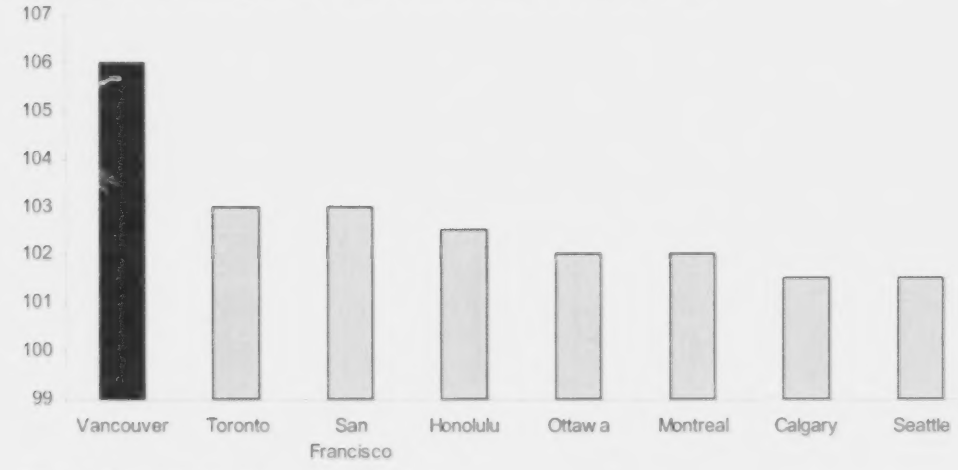
Vancouver is ranked as having the highest overall quality of life in North America and second highest in the world. This would seem to provide a substantial competitive advantage in attracting high tech workers.

The indicator explained...

Mercer Human Resource Consulting—a large international management firm—developed "quality of life" scales to assist companies in determining hardship pay. Such allowances are often provided when a company sends employees to work in foreign (particularly third world) countries. The Mercer quality of life survey provides rankings based on 39 indicators, grouped into ten categories:

- *"Political and social environment* (political stability, crime, law, enforcement, etc)
- *Economic environment* (currency exchange regulations, banking services, etc)
- *Socio-cultural environment* (censorship, limitations on personal freedom, etc)
- *Medical and health considerations* (medical supplies and services, infectious diseases, sewage, waste disposal, air pollution, etc)
- *Schools and education* (standard of schools)
- *Public services and transportation* (electricity, water, public transport, traffic congestion, etc)
- *Recreation* (restaurants, theatres, cinemas, sports and leisure, etc)
- *Consumer goods* (availability of food/daily consumption items, cars, etc)
- *Housing* (housing, household appliances, furniture, maintenance services, etc)
- *Natural environment* (climate, record of natural disasters) "

INDICATOR L-3: Quality of life index scores, 2002 (New York = 100)



Source: Mercer Human Resource Consulting

Vancouver's score of 106 on the overall quality of life index is well above Toronto (103), Ottawa and Montreal (102), and Calgary (101.5). In terms of ranking among the 235 cities included in the study, Vancouver ranks second (tied with Vienna), far higher than Toronto (18th), Montreal (25th), and Calgary (31st). Key American cities that BC competes with for high tech workers and firms (particularly Seattle and San Francisco) also rank considerably lower than Vancouver.

Quality of Life Ranking 2002

	Score	Global Rank	North Am. Rank
Vancouver	106.0	2	1
Toronto	103.0	18	2
San Francisco	103.0	18	2
Honolulu	102.5	22	4
Ottawa	102.0	25	5
Montreal	102.0	25	5
Calgary	101.5	31	7
Seattle	101.5	31	7
Los Angeles	101.0	35	9

Vancouver's quality of life score has dropped slightly since 2001 (-0.5 percentage points). This was just enough to drop out of the number one global rank (now held by Zurich, Switzerland). Calgary was also down half a percentage point, and Montreal fell a full percentage point. Toronto's score remained unchanged.

Cost of Living

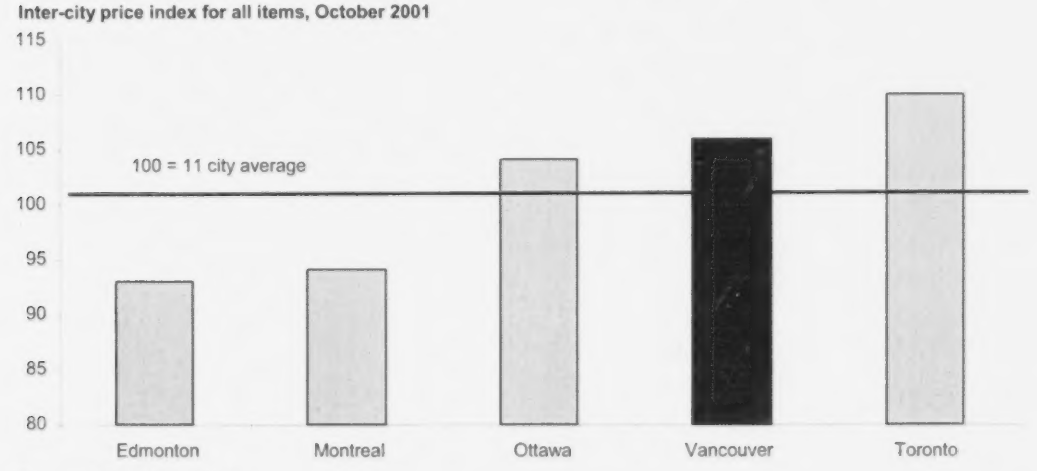
The high quality of life in Vancouver comes with a price. Vancouver is the second most expensive urban centre in Canada, in terms of both general retail prices and shelter costs.

The indicators explained...

The inter-city price index compares the cost of consumer goods and services in different parts of the country. The "all items" price index is based on a bundle of goods and services that represents the expenditure patterns of a hypothetical average Canadian household. The largest component of the all items index is shelter. This includes the cost of owned or rented housing and related expenses (insurance, electricity, fuel oil, etc). The inter-city price index is only available for two points in time, October 1999 and October 2001. Prices recorded are the final price facing consumers, including sales and excise taxes.

In Vancouver, retail prices were 6% higher than the combined city average in October 2001, second only to Toronto (10% above average). In Edmonton, prices were 7% below the combined city average. The absence of a provincial sales tax in Alberta partly explains Edmonton's comparatively low prices. Between 1999 and 2001, retail prices inched up (compared to the average) in Vancouver (from 5% to 6% above average).

INDICATOR L-4: Vancouver has second-highest retail prices in Canada



Source: Statistics Canada

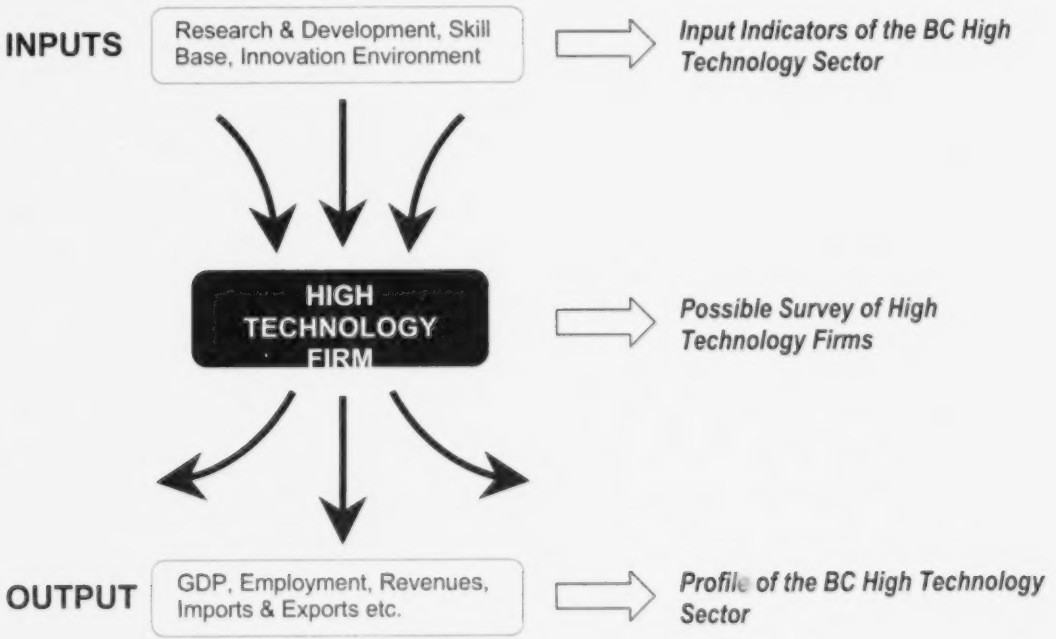
The largest component of the inter-city price index is shelter costs. In Vancouver, shelter costs were 10% above the combined city average, again the second highest in Canada. In Toronto, shelter costs were a striking 27% above average. These costs were well below average in Edmonton (17% lower) and Montreal (16% lower).

APPENDIX I: BC STATS' SECTOR MODEL

In BC STATS' model of the high technology sector (see "Modeling the High Technology Sector," below), the **firm** is the centre of the system of high technology production. The firm receives inputs, in the form of labour, physical and financial capital, raw materials and parts, and knowledge. Knowledge may be embodied in labour (human capital) or other inputs, or it may come in the form of patents and copyrights, books and electronic information, etc. Through its internal operations, the firm then produces outputs. These outputs are products and services, and (in some views) also include employment and other benefits to society.

This firm-centred view underlies BC STATS' publication strategy for high technology sector information, as shown in the diagram below.

TABLE 7: BC STATS' Products for Monitoring the High Technology Sector.


INPUTS
Research & Development, Skill Base, Innovation Environment
Input Indicators of the BC High Technology Sector
HIGH TECHNOLOGY FIRM
Possible Survey of High Technology Firms
OUTPUT
GDP, Employment, Revenues, Imports & Exports etc.
Profile of the BC High Technology Sector

APPENDIX I

What is an Indicator?

The concept of indicators is well understood in the operation of machines. For instance, the dashboard of a car has many indicators. The speedometer measures the main output, which is forward motion. However, gauges such as oil pressure and water temperature assess how well the engine is working as a system. They predict the engine's future performance, and may suggest the need for specific adjustments.

When we want to predict the future, in terms of the economy, we need to examine the chain of events that leads to the production of specific outputs, and develop indicators for those steps in the chain judged to be most important. When we want to predict the future in terms of the high technology sector, we similarly need to develop a model of what drives growth in the sector, and then obtain indicators for each component of the model.

In selecting indicators, consideration must be given not only to their place in a growth model of the high technology sector, but also to their accuracy and availability. Indicators should meet other tests as well. In the annual (since 1997) *Index of the Massachusetts Innovation Economy,*[8] all potential indicators are subject to a set of five criteria. The indicators selected for inclusion in the report are:

- Derived from objective and reliable data sources,
- Statistically measurable on an ongoing basis,
- Bellwethers that reflect the fundamentals of economic vitality,
- Understood and accepted by the community, and
- Measurements of conditions in which there is an active public interest.

These criteria help ensure that the indicators become relevant to politicians and citizens as well as to statisticians, and have been adopted for this report as well.

How is Research Progressing in this Field?

Detailed and generally accepted models for high technology sector growth do not exist at present. However, there has been loose agreement on some of the most important factors. One of the first of these factors to be explored was "research and development" spending. At the international level, the Organization for Economic Cooperation and Development (OECD), of which Canada is a member nation, took the lead with the *Frascati Manual: Proposed Standard*

[8]Collaborative Economics and Massachusetts Technology Collaborative, *Index of the Massachusetts Innovation Economy*, 1999. Available at http://www.mtpc.org/research/indica99.htm

Practice for Surveys of Research and Experimental Development (1963). Meeting in Frascati, Italy, national experts of research and development statistics recognized the need for consistent, comparable international measures. Their proposal became the international standard.

In 1995, the Science and Technology Agency of Japan published *Science and Technology Indicators: 1994 – A Systematic Analysis of Science & Technology Activities in Japan*, an update and revision of a similar document published in 1991. This comprehensive project was heavily focused on international comparisons between Japan and other nations, on the one hand comparing ratios of science and technology expenditures to Gross National Product for several leading science and technology countries, while on the other comparing the number of museums in Japan to the number in other countries. The critical focus, however, was on comparisons of R&D expenditures and effort between nations.

In 1997, the Massachusetts Technology Collaborative, a joint effort of government, industry and academia, produced the first of its annual publications, *Index of the Massachusetts Innovation Economy* that presented 33 indicators (a mixture of both input and output indicators). However, these indicators are focused more on the intangible *innovation* economy which is "based on a dynamic conceptual framework that links resources to economic results through an innovation process." The index annually tracks the benchmark performance (indicators) of nine key industry clusters for six leading technology states throughout the United States. The 2000 version of the *Index* covers 30 separate indicators.

A similar effort has been produced by the Progressive Policy Institute (PPI) in the United States, which is responsible for the "New Economy Index." PPI offers thirty-nine indicators at the national level, and seventeen for each of fifty states.[9]

In 1998, Statistics Canada published *Science and Technology Activities and Impacts: A framework for a statistical information system* as well as *A Five-Year Strategic Plan for the Development of an Information System for Science and Technology*. These documents did not themselves contain any indicators but rather proposed a framework and strategy for the collection of science and technology indicators. However, Statistics Canada also stated "There is little underlying theory of how science and technology develops and interacts with other activities in different institutions. There are some procedural measures, many unsubstantiated beliefs and myths, and there are major information gaps." These caveats from Statistics Canada show that there is still much work to be done in this field.

[9]Available at http://www.neweconomyindex.org/states/

APPENDIX I

In 1998, BC STATS, the Information, Science and Technology Agency of British Columbia, and the Science Council of British Columbia began a collaboration to devise a model of the BC high technology sector, with an associated set of indicators. This resulted in two working papers. The first reviewed definitions of the high technology sector and models of the innovation economy in other jurisdictions, while the second proposed a model for use in BC, together with a large number of potential indicators for that model.[10] Subsequently BC STATS has simplified the model and prepared a corresponding shorter list of indicators. The simplified model and indicators form the basis for this publication.

Modeling the High Technology Sector

The traditional model of economic production focuses on land, labour and capital, which are the "factors of production" or inputs into the production process. These factors are transformed by firms, other organizations, or individuals into valued goods and services. GDP is the main measure of that value and is the most common statistic used to describe the production of economic sectors. This traditional model can be thought of as an input/output view of the economy. The inputs are obtained from a variety of sources and enter a production process, resulting in outputs.[11]

The advent of the "information economy" has added a new dimension to traditional economic production, and some efforts to describe it seem quite new as well. However, the input/output view can readily be adapted to the information economy. In the model above the firm is at the centre of the productive system. As in the traditional model, the firm receives inputs, however knowledge, technology, and information are distinguished as a unique category. This can include patents and copyrights, software, information on production methods, etc. In addition, it is recognized that the other factors, labour, capital, and materials each have critical and increasing quantities of knowledge embodied in them.

The diagram then looks beyond the production inputs, to analyze their sources (the top row of boxes). For example, skilled labour may come from training courses in educational institutions, from in-house training, or from other provinces or countries. The sources for the inputs have been categorized as four "sectors." Within each sector, particular areas that bear on the

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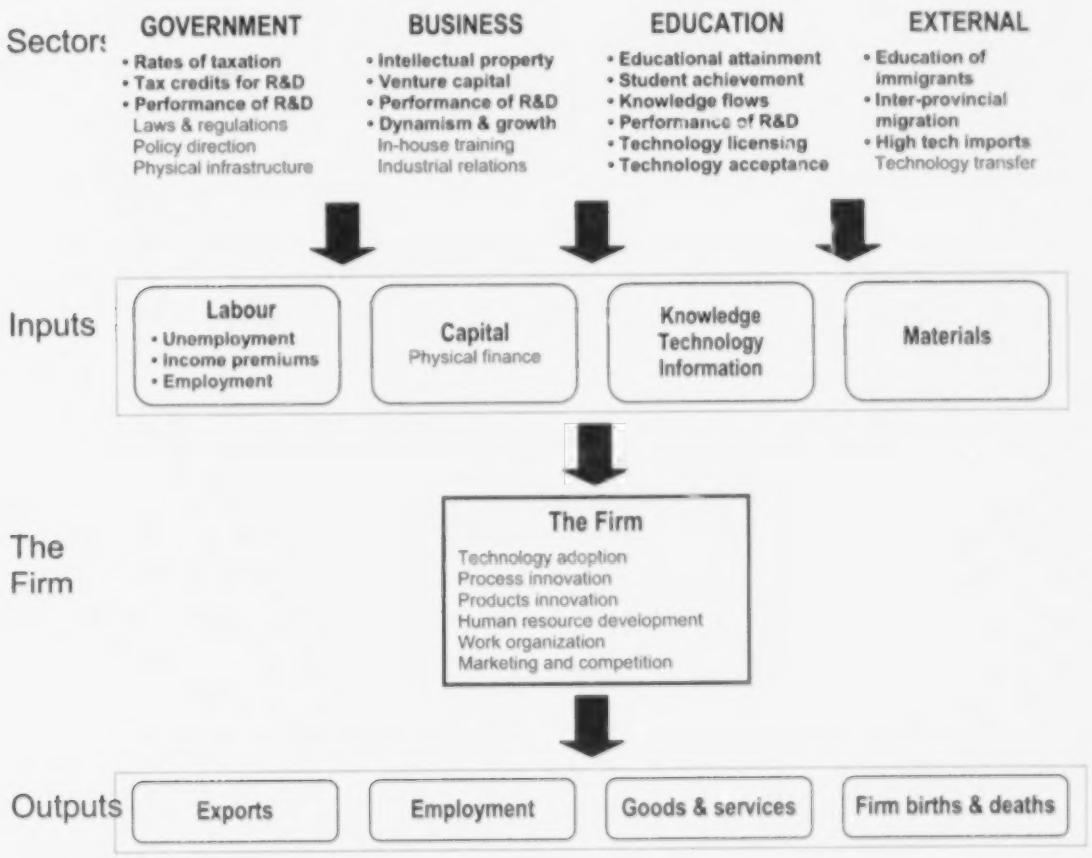
[10]Koebberling, Uschi and Veneranda Dettmers, "A Model of the BC High Technology Sector: Description of Factors and Linkages Affecting the Growth of the High Technology Sector in the Context of an Innovation Economy," Science Council of BC, April 1999.

[11] This is also referred to as the neoclassical model. See Lipsey, Richard G. and Kenneth Carlaw, "A Structuralist Assessment of Technology Policies—Taking Schumpeter Seriously on Policy," Working Paper # 25, Industry Canada, Research Publications Program, October 1998. Available at http://www.strategis.ic.gc.ca

production inputs are identified. These areas are the ones for which indicator variables have been sought out. The areas listed in bold, and ticked off, are the ones for which data is available and has been collected by BC STATS.

TABLE 8: Model of the High Technology Sector.



While the indicator variables have normally been sought out at the level of the source sectors, certain labour indicators, such as the unemployment rate, are not attributable to a single source sector. Such indicators have been grouped in a separate "labour" section.

Once the inputs are obtained by the firm, they are transformed in a way that depends on the firm's many characteristics. Some of the characteristics of most importance for high technology firms are listed within the FIRM box in the diagram.[12]

Finally, the firm produces and sells goods and services, some of which are consumed locally, while the remainder are exported. This is depicted in the bottom row. It should be recognized that even with a simplified model such as the one set out here, it is possible to imagine a large number of interactions. That is, almost every box or element within the boxes could be joined by an arrow to every other box or element. In turn, a complete statistical system based on the model would track the flows of people, dollars, or information along each of the pathways (arrows). Such a comprehensive approach is neither practical, nor would it in the end necessarily lead to greater understanding and better policy. However, statistics are available on a significant number of the interactions, providing a strong database for future research.

[12]For an in-depth study of uses of knowledge within high technology firms, see Schuetze, Hans, "Innovation, Skills, and Learning: A Study of Knowledge and Human Resources Management in Small and Medium Sized Enterprises in British Columbia," Centre for Policy Studies in Education, University of British Columbia, March 1998.

APPENDIX II: DEFINITIONS OF THE HIGH TECH SECTOR

Here is the Standard Industrial Classification based definition for the high tech sector which was used up to 2000. This definition was taken from the paper Defining the High Tech Sector in BC Using NAICS. This paper can be found at http://www.bcstats.gov.bc.ca/data/bus_stat/hi_tech/NAICSdef.pdf. Note that these definitions were used in this publication to determine the number of establishments, entries, exits and high growth companies for the high tech sector. This is not intended to be a statement of what the permanent definition of high tech is as it is subject to revision.

SIC	Description
3192	Construction and Mining Machinery and Materials Handling Equipment Industry
3194	Turbine and Mechanical Power Transmission Equipment Industry
3199	Other Machinery and Equipment Industries
3211	Aircraft and Aircraft Parts
3271	Electrical Transformer Industry
3351	Telecommunications Equipment
3352	Electronic Parts and Components Industry
3359	Other Communications and Electronic Equipment Industries
3361	Electronic Computing and Peripheral Equipment
3362	Electronic Office, Store and Business Machine Industry
3369	Other Office, Store and Business Machine Industries
3372	Electrical Switchgear and Protective Equipment Industry
3379	Other Electrical Industrial Equipment Industries
3381	Communications and Energy Wire and Cable Industry
3711	Industrial Inorganic Chemical Industries
3741	Pharmaceutical and Medicine Industry
3911	Indicating, Recording and Controlling Instruments Industry
3912	Other Instruments and Related Products Industry
3994	Musical Instrument and Sound Recording Industry
3999	Other Manufactured Products Industries
772	Computer and Related Services
7752	Offices of Engineers
7759	Other Scientific and Technical Services
868	Medical and Other Health Laboratories

APPENDIX II

Here is the North American Industry Classification System based definition of the High Tech Sector in BC. This definition has been used since 2001 and it should be noted that computer software and hardware retailers and wholesalers were left out of the definition.

NAICS	Description
511210	Software Publishers
541710	Research and Development in the Physical, Engineering and Life Science
334512	Measuring, Medical and Controlling Devices Manufacturing
541510	Computer Systems Design and Related Services
334210	Telephone Apparatus Manufacturing
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing
334410	Semiconductor and Other Electronic Component Manufacturing
334511	Navigational and Guidance Instruments Manufacturing
335990	All Other Electrical Equipment and Component Manufacturing
541330	Engineering Services
325410	Pharmaceutical and Medicine Manufacturing
334110	Computer and Peripheral Manufacturing
336410	Aerospace Products and Parts Manufacturing
335315	Switch-gear and Switchboard, and Relay and Industrial Control Apparatus Manufacturing
334290	Other Communications Equipment Manufacturing
339110	Medical Equipment and Supplies Manufacturing
514210	Data Processing Services
541620	Environmental Consulting Services
541720	Research and Development in the Social Sciences and Humanities
621510	Medical and Diagnostic Laboratories
325189	Other Inorganic Chemical Manufacturing
333310	Commercial and Service Industry Manufacturing
334310	Audio and Video Equipment Manufacturing
334610	Manufacturing and Reproducing Magnetic and Optical Media
335910	Battery Manufacturing
335920	Communication and Energy Wire and Cable

APPENDIX III: DETAILED TABLES

Educational indicators

INDICATOR E-1: Percentage of the population aged 15 years and older with a high school diploma

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CANADA	62.1	62.8	64.2	65.9	66.2	67.1	68.0	69.2	69.8	70.6	71.8	72.8	73.6
NFLD	51.6	52.9	54.2	55.1	55.2	56.8	57.8	58.4	59.7	60.9	62.4	63.6	65.2
PEI	51.2	52.2	54.8	57.9	57.3	59.1	60.5	60.8	62.6	62.8	64.2	66.9	69.4
NS	57.5	58.0	59.4	61.3	60.7	62.0	63.0	64.8	66.4	67.0	68.1	69.8	69.7
NB	55.6	56.2	58.2	60.2	61.0	62.3	61.5	64.0	65.6	65.7	66.0	67.7	68.6
PQ	56.6	57.5	59.0	60.9	60.6	61.8	63.0	65.3	65.6	66.4	67.3	67.9	69.2
ON	64.2	64.6	66.0	67.6	68.4	69.3	69.8	70.5	71.1	72.6	73.9	74.8	75.5
MB	58.1	59.3	60.6	61.1	62.0	63.2	64.7	66.0	66.3	66.5	68.3	69.4	70.2
SK	58.0	58.1	59.5	61.4	61.7	62.7	62.9	64.2	66.1	66.0	67.6	68.4	69.5
AB	67.9	68.7	69.6	71.5	71.5	71.7	72.7	73.7	74.8	74.3	75.1	76.5	76.9
BC	70.5	71.8	72.3	73.6	73.9	74.3	75.4	75.2	75.7	75.9	77.3	78.1	78.4

INDICATOR E-2: Percentage of the population aged 15 years and older with post-secondary credentials

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CANADA	32.6	33.0	34.1	35.5	37.6	38.6	39.3	41.2	41.8	42.5	42.7	44.1	45.0
NFLD	28.4	29.5	30.6	31.2	32.4	34.1	33.8	35.3	36.6	38.0	38.8	40.0	41.3
PEI	27.4	27.5	29.7	32.3	34.7	37.3	36.9	37.9	38.6	39.4	39.5	42.2	43.4
NS	35.7	36.1	36.9	37.8	39.5	40.2	41.4	43.4	44.1	44.7	44.8	46.7	46.1
NB	28.7	28.0	29.4	31.5	33.8	34.7	34.1	35.7	36.6	38.8	38.8	40.3	39.8
PQ	31.8	32.7	34.4	35.9	37.5	39.3	40.1	42.4	42.9	43.3	43.5	44.5	46.1
ON	33.1	33.5	34.4	35.3	37.8	38.1	39.0	41.3	41.5	42.6	43.1	44.7	45.5
MB	28.1	29.5	29.6	30.6	31.6	34.2	35.1	36.6	38.3	39.2	39.0	39.7	39.9
SK	28.9	28.5	30.0	31.1	32.9	33.9	33.2	34.6	36.4	36.6	37.4	38.6	39.4
AB	35.2	35.8	37.0	39.3	40.4	40.9	41.2	42.7	44.0	43.6	43.2	45.8	46.4
BC	34.1	33.7	33.5	36.5	39.8	40.3	41.1	42.1	42.4	42.9	42.8	43.8	44.1

APPENDIX III

INDICATOR E-3: Canada-wide rank of 16-year old achievement in science

	1996	1999	2000
NFLD	4	5	7
PEI	6	2	9
NS	10	6	7
NB	9	9	10
PQ	8	4	2
ON	6	10	5
MB	2	3	4
SK	3	8	5
AB	1	1	1
BC	5	6	3

INDICATOR E-4: Engineering bachelors degrees awarded per 100,000 persons aged 15 years and older

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CANADA	33.3	33.1	33.8	33.7	35.0	36.2	36.7	34.8	34.8	39.2	40.5
NFLD	18.4	25.7	23.2	26.3	27.0	30.6	28.1	26.7	29.1	27.4	28.4
PEI	-	-	-	-	-	-	-	-	-	-	-
NS	28.0	23.3	25.0	22.1	29.2	35.7	29.7	39.0	36.5	40.5	37.4
NB	36.2	34.2	33.8	38.8	34.5	40.7	38.7	40.7	49.6	55.9	58.8
PQ	43.5	45.3	44.4	43.9	45.1	45.3	45.1	41.3	40.7	47.6	46.0
ON	34.9	34.0	36.3	35.5	37.5	39.1	41.0	38.3	37.8	41.1	43.9
MB	21.5	20.1	24.2	24.4	25.3	26.3	28.3	26.2	28.5	25.2	23.9
SK	27.4	31.4	28.8	29.6	29.6	31.3	34.7	33.8	32.4	36.1	43.9
AB	35.8	32.9	30.8	28.1	32.9	31.3	34.4	31.9	33.3	35.0	37.6
BC	14.4	14.0	15.7	17.4	17.2	19.1	16.8	17.1	17.2	25.4	26.3

- nil or zero

INDICATOR E-5: Computer Science bachelors degrees awarded per 100,000 persons aged 15 years and older

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CANADA	10.3	10.4	10.5	10.7	11.4	13.0	13.0	12.9	13.5	15.2	18.6
NFLD	4.3	5.6	5.8	5.6	4.2	4.7	9.4	10.8	9.8	13.5	10.2
PEI	-	-	-	-	-	-	-	-	-	4.6	2.7
NS	12.8	10.7	13.3	13.6	13.3	16.3	20.1	17.8	19.7	22.0	26.6
NB	12.8	13.7	11.4	12.5	16.9	15.7	17.3	16.3	16.8	19.2	19.4
PQ	12.4	12.0	12.0	12.5	11.5	12.8	13.1	13.8	13.6	16.0	19.1
ON	10.0	10.1	10.8	10.3	11.5	13.2	13.3	13.6	14.3	16.0	20.6
MB	8.5	12.1	13.1	16.3	20.5	22.0	18.8	16.7	17.7	17.1	19.5
SK	13.5	15.7	14.3	16.4	17.6	18.2	18.3	14.3	16.5	18.1	25.7
AB	9.3	8.6	9.1	7.6	9.0	10.7	9.4	9.5	10.3	11.8	11.3
BC	7.7	7.2	6.3	7.6	8.5	10.8	9.7	9.1	10.2	11.1	15.0

- nil or zero

INDICATOR E-6: Percentage of households with home computers

	1997	1998	1999	2000	2001
CANADA	39.8	45.0	49.8	54.9	59.9
NFLD	27.9	34.4	38.6	41.7	49.3
PEI	28.4	32.6	39.6	40.3	48.6
NS	33.5	37.2	42.1	47.8	56.0
NB	31.1	32.1	37.4	44.0	48.1
PQ	31.7	38.4	42.2	44.8	51.1
ON	44.3	48.9	54.6	60.6	66.1
MB	33.2	40.9	44.2	47.6	51.6
SK	36.0	37.3	42.3	48.4	51.1
AB	46.7	50.7	57.9	61.2	66.1
BC	46.8	51.8	54.5	63.1	64.3

APPENDIX III

INDICATOR E-7: Percentage of households using the Internet (%)*

	1997	1998	1999	2000	2001
CANADA	29.0	35.9	41.8	51.3	60.2
NFLD	26.1	28.8	35.2	45.5	50.2
PEI	25.7	35.4	40.5	51.1	57.8
NS	31.8	37.8	41.1	52.0	57.4
NB	28.1	31.0	38.0	45.2	52.4
PQ	19.8	26.2	33.1	43.6	53.7
ON	32.9	39.1	44.5	54.2	63.7
MB	28.8	33.3	38.3	49.8	56.7
SK	26.4	33.7	39.9	46.9	52.6
AB	34.0	45.1	50.8	58.8	65.3
BC	33.0	42.0	48.1	55.9	65.3

*includes use from home, work, school, libraries and other locations.

Indicator E-8: Percentage of small businesses using the Internet

Internet user	Jun-98	Jul-99	Jul-00	Jul-01	Jan-02
NFLD	43.9	57.9	51.5	53.8	68.3
PEI	54.0	69.1	70.4	78.0	80.4
NS	57.4	65.6	74.5	76.1	71.5
NB	48.7	61.7	66.9	69.8	70.3
PQ	36.1	53.0	59.8	63.0	67.1
ON	57.6	68.8	75.1	77.0	75.1
MB	51.0	62.0	66.7	75.8	73.7
SK	48.6	63.7	65.1	63.2	70.0
AB	56.2	72.2	71.8	77.8	79.3
BC	58.3	69.0	72.2	76.0	77.6
CANADA	52.1	65.1	69.5	72.5	73.2

INDICATOR E-9: Gross income from technology licenses at universities (in $ thousands US)*

INSTITUTION	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Queens	274	608	528	441	399	959	554	547	675	5,454
U of Toronto	327	920	1,119	821	2,251	2,459	1,606	1,585	894	1,869
Western Ontario	4	6	4	7	11	8	46	45	44	22
U of Alberta	167	332	290	580	721	3,080	3,053	3,013	2,443	1,099
U of BC	339	604	793	879	930	546	865	854	840	2,827
Waterloo	2,167	1,600	1,240	1,400	1,300	1,276	845	1,569	459	420

* 2000 is the latest year for which information is available

INDICATOR E-10: Number of US patents issued to top two institutions (actual)*

PROVINCE	1993	1994	1995	1996	1997	1998	1999	2000
ON	21	12	22	16	12	9	18	24
AB	15	8	12	18	18	18	26	25
BC	23	18	18	29	20	24	55	26

* 2000 is the latest year for which information is available

INDICATOR E-11: Ratio of higher education performance of R&D to GDP (%)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CANADA	0.44	0.48	0.50	0.50	0.47	0.46	0.44	0.45	0.48	0.53	0.54
NFLD	0.59	0.60	0.63	0.62	0.57	0.55	0.54	0.58	0.64	0.63	0.60
PEI	0.19	0.23	0.21	0.18	0.15	0.14	0.15	0.21	0.38	0.37	0.44
NS	0.69	0.72	0.67	0.65	0.60	0.60	0.60	0.61	0.77	0.92	0.83
NB	0.34	0.36	0.38	0.36	0.35	0.34	0.34	0.34	0.46	0.48	0.45
PQ	0.57	0.66	0.73	0.72	0.66	0.62	0.60	0.61	0.62	0.71	0.70
ON	0.42	0.43	0.45	0.47	0.45	0.44	0.44	0.44	0.46	0.50	0.54
MB	0.46	0.47	0.48	0.45	0.44	0.42	0.39	0.36	0.42	0.50	0.62
SK	0.44	0.47	0.49	0.50	0.44	0.43	0.39	0.41	0.48	0.58	0.68
AB	0.38	0.40	0.39	0.36	0.35	0.36	0.33	0.34	0.38	0.41	0.39
BC	0.35	0.37	0.38	0.34	0.33	0.34	0.32	0.32	0.34	0.37	0.39

APPENDIX III

Business Indicators

INDICATOR B-1: Patents awarded per 100,000 population

	1998	1999	2000	2001	2002
CANADA	2.73	4.34	3.64	3.92	3.98
NFLD	0.73	1.11	0.56	0.75	0.94
PEI	0.73	1.45	1.45	0.72	0.71
NS	0.43	1.17	0.64	1.38	1.69
NB	1.86	2.25	1.06	1.85	1.45
PQ	2.79	4.12	3.90	4.15	4.35
ON	3.30	5.61	4.24	4.37	4.19
MB	1.76	2.80	2.09	2.96	2.61
SK	3.22	3.22	3.23	2.65	2.87
AB	3.10	5.54	5.08	5.82	6.81
BC	1.90	2.56	2.56	2.83	2.70

INDICATOR B-2: Patents granted as a percent of patent applications

	2000	2001	2002	Average
CANADA	25	25	25	25
NFLD	13	25	25	21
PEI	29	13	20	20
NS	18	23	28	23
NB	18	26	19	21
PQ	23	21	23	22
ON	27	26	25	26
MB	19	33	28	27
SK	36	19	25	27
AB	26	31	36	31
BC	24	24	20	23

INDICATORS B-3, B-4 and B-5: Number of establishments, entries, exits, and high growth companies in the BC economy

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
BC Firms	133,747	140,440	146,417	149,315	153,289	154,027	154,944	157,371	157,421	157,652
Entries	n/a	n/a	n/a	27,527	28,837	26,533	24,006	23,534	21,536	21,560
Exits	n/a	n/a	n/a	(24,619)	(24,862)	(25,796)	(23,088)	(21,107)	(21,487)	(21,329)
High growth companies	n/a	n/a	n/a	2,315	2,688	2,286	2,590	4,903	2,441	2,318

INDICATORS B-3, B-4 and B-5: Number of establishments, entries, exits, and high growth companies in the high technology sector

	1997	1998	1999	2000	2001	2002
Establishments	4,313	4,741	5,021	5,391	5,452	5,351
Entries	n/a	1,287	1,047	1,155	1,064	999
Exits	n/a	(859)	(767)	(785)	(1,003)	(1,100)
High growth companies	n/a	83	139	200	105	77

INDICATOR B-6: Canadian venture capital investment by province of investment ($ million)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CANADA	270	285	369	420	617	1,045	1,679	1,495	2,491	5,269	3,800	2,466
ATLANTIC	0	0	3	2	7	27	22	34	61	75	49	43
PQ	98	105	197	172	258	325	546	630	727	1,410	984	722
ON	64	120	101	125	218	467	704	531	1,257	2,939	2,107	1,291
MB	16	3	6	21	15	39	88	26	46	39	44	27
SK	2	11	16	45	37	42	51	34	21	23	14	47
AB	47	19	31	10	18	42	61	93	129	243	88	85
BC	43	27	15	45	64	103	207	147	250	540	514	251

APPENDIX III

INDICATOR B-7: Proportional share of Canadian venture capital investment

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
ATLANTIC	0.0	0.0	0.8	0.5	1.1	2.6	1.3	2.3	2.5	1.4	1.3	1.7
PQ	36.3	36.8	53.4	41.0	41.8	31.1	32.5	42.1	29.2	26.1	25.9	29.3
ON	23.7	42.1	27.4	29.8	35.3	44.7	41.9	35.5	50.5	54.5	55.4	52.4
MB	5.9	1.1	1.6	5.0	2.4	3.7	5.2	1.7	1.8	0.7	1.2	1.1
SK	0.7	3.9	4.3	10.7	6.0	4.0	3.0	2.3	0.8	0.4	0.4	1.9
AB	17.4	6.7	8.4	2.4	2.9	4.0	3.6	6.2	5.2	4.5	2.3	3.4
BC	15.9	9.5	4.1	10.7	10.4	9.9	12.3	9.8	10.0	10.0	13.5	10.2

TABLE 9: Canadian venture capital investment per capita ($)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CANADA	10.31	10.89	13.95	15.89	22.87	35.47	60.93	54.93	89.44	215.99	122.54	78.75
ATLANTIC	0.00	0.00	1.26	0.84	2.94	11.34	9.24	14.34	25.68	31.59	20.66	18.12
PQ	13.87	14.76	27.49	23.86	35.63	44.68	74.77	86.02	98.90	191.01	132.66	96.85
ON	6.14	11.35	9.45	11.54	19.88	42.07	62.58	46.63	109.04	251.25	177.14	106.97
MB	14.42	2.70	5.37	18.69	13.28	34.38	77.42	22.85	40.26	34.02	38.29	23.46
SK	1.99	10.96	15.89	44.57	36.48	41.20	49.90	33.17	20.48	22.51	13.76	46.45
AB	18.13	7.21	11.61	3.70	6.57	15.10	21.50	31.99	43.59	80.73	28.77	27.30
BC	12.75	7.78	4.20	12.22	16.91	26.53	52.28	36.78	62.06	133.00	125.32	60.61

INDICATOR B-8: Ratio of business performance of R&D to GDP (%)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CANADA	0.76	0.78	0.82	0.88	0.98	0.99	0.96	0.99	1.06	1.04	1.08
NFLD	0.11	0.10	0.10	0.11	0.12	0.10	0.16	0.13	0.15	0.15	0.13
PEI	0.09	0.09	0.04	0.08	0.08	0.11	0.11	0.07	0.07	0.13	0.15
NS	0.18	0.15	0.18	0.24	0.33	0.33	0.28	0.27	0.29	0.28	0.26
NB	0.34	0.22	0.21	0.28	0.32	0.32	0.35	0.22	0.23	0.21	0.16
PQ	0.92	0.98	1.04	1.11	1.21	1.28	1.33	1.34	1.41	1.44	1.40
ON	1.00	1.04	1.09	1.20	1.32	1.31	1.26	1.34	1.42	1.38	1.52
MB	0.20	0.27	0.29	0.37	0.39	0.36	0.33	0.30	0.33	0.46	0.37
SK	0.22	0.25	0.31	0.26	0.29	0.28	0.20	0.29	0.26	0.26	0.20
AB	0.49	0.48	0.45	0.49	0.58	0.53	0.53	0.51	0.58	0.41	0.37
BC	0.46	0.43	0.49	0.50	0.59	0.57	0.50	0.49	0.53	0.59	0.66

APPENDIX III

Government Indicators

INDICATOR G-1: Index of all taxes paid by unattached individuals earning $80,000 per year (BC 1992=100)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
NFLD	110.3	117.6	110.9	111.3	111.4	110.1	109.8	108.5	104.3	99.5	98.8	97.7
PEI	104.9	105.3	101.4	101.4	101.5	101.5	102.7	101.3	98.4	92.0	91.3	89.6
NS	106.6	107.3	104.1	102.8	102.9	102.4	103.6	99.4	97.1	95.1	94.4	91.0
NB	103.7	104.1	100.9	100.9	101.0	100.4	100.8	99.3	96.9	93.0	92.0	87.1
PQ	116.8	127.0	126.7	124.3	126.0	125.9	126.2	124.3	121.0	120.2	117.3	113.0
ON	105.0	113.8	111.8	111.4	111.5	106.5	104.2	103.2	99.7	92.1	90.4	87.6
MB	107.8	114.5	110.3	110.8	112.6	112.6	112.4	110.2	106.6	102.6	100.9	101.8
SK	106.1	110.2	105.4	105.4	105.2	105.2	108.2	104.8	102.1	93.7	92.4	85.6
AB	96.1	95.1	93.0	93.4	93.4	93.3	92.5	90.4	87.3	79.2	78.3	78.0
BC[1]	100.0	101.6	98.8	98.1	98.0	97.3	96.4	95.6	93.0	83.5	80.5	78.0

INDICATOR G-2: Small business tax rate

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003*
NFLD	10.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
PEI	10.0	10.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
NS	10.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
NB	9.0	9.0	9.0	6.0	7.0	4.0	7.0	7.0	6.0	6.0	4.0	4.0	3.0
PQ	3.5	3.8	3.8	5.8	5.8	5.8	5.8	5.9	9.2	8.9	9.0	9.0	9.0
ON	10.0	10.0	9.5	9.5	9.5	9.5	9.5	9.5	8.5	7.0	6.5	6.0	5.5
MB	10.0	10.0	10.0	10.0	9.0	9.0	9.0	9.0	9.0	7.0	6.0	5.0	5.0
SK	10.0	10.0	9.0	9.5	8.0	8.0	8.0	8.0	8.0	8.0	6.0	6.0	6.0
AB	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.0	5.0	4.5
BC	9.0	10.0	10.0	10.0	10.0	9.0	9.0	9.0	5.5	4.8	4.5	4.5	4.5

* Projected

INDICATOR G-3: General corporate income tax rate

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003*
NFLD	17.0	17.0	16.0	16.0	16.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
PEI	15.0	15.0	15.0	15.0	15.0	15.0	15.0	16.0	16.0	16.0	16.0	16.0	16.0
NS	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
NB	17.0	17.0	17.0	17.0	14.0	17.0	17.0	17.0	17.0	17.0	16.0	16.0	13.0
PQ	6.3	6.9	6.9	8.9	8.9	8.9	8.9	9.2	9.2	9.0	9.0	9.0	9.0
ON	15.0	15.0	15.5	15.5	15.5	15.5	15.5	15.5	15.5	14.0	14.0	12.5	12.5
MB	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.5	16.0
SK	15.0	15.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
AB	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	13.5	13.5	13.0
BC	15.0	16.0	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	13.5	13.5

* Projected

INDICATOR G-4: Combined federal and provincial performance of R&D as a % of GDP

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CANADA	0.29	0.29	0.29	0.28	0.26	0.24	0.24	0.22	0.21	0.21	0.22
NFLD	0.41	0.41	0.41	0.41	0.37	0.30	0.29	0.26	0.27	0.25	0.25
PEI	0.46	0.44	0.38	0.45	0.44	0.34	0.32	0.32	0.34	0.38	0.47
NS	0.50	0.48	0.43	0.44	0.48	0.42	0.43	0.38	0.39	0.34	0.39
NB	0.30	0.29	0.28	0.24	0.20	0.19	0.20	0.19	0.20	0.19	0.15
PQ	0.20	0.20	0.20	0.21	0.19	0.18	0.17	0.15	0.16	0.16	0.20
ON	0.37	0.39	0.39	0.38	0.35	0.34	0.35	0.31	0.29	0.28	0.28
MB	0.40	0.41	0.34	0.35	0.32	0.28	0.26	0.19	0.16	0.18	0.22
SK	0.29	0.29	0.31	0.29	0.24	0.24	0.20	0.28	0.22	0.23	0.21
AB	0.20	0.20	0.20	0.16	0.16	0.16	0.14	0.13	0.14	0.15	0.13
BC	0.16	0.15	0.13	0.12	0.13	0.10	0.09	0.10	0.09	0.11	0.11

APPENDIX III

INDICATOR G-5: Total expenditures (private and public sector) on R&D as a % of GDP

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CANADA	1.51	1.57	1.62	1.68	1.73	1.70	1.65	1.66	1.76	1.78	1.84
NFLD	1.12	1.11	1.15	1.14	1.06	0.95	1.00	0.98	1.06	1.04	0.99
PEI	0.74	0.71	0.60	0.69	0.67	0.60	0.57	0.57	0.77	0.85	1.06
NS	1.39	1.36	1.29	1.34	1.42	1.37	1.32	1.26	1.46	1.50	1.49
NB	1.00	0.89	0.87	0.88	0.88	0.85	0.90	0.76	0.89	0.87	0.76
PQ	1.70	1.85	1.97	2.03	2.05	2.08	2.10	2.09	2.20	2.31	2.30
ON	1.60	1.63	1.68	1.82	1.91	1.87	1.83	1.89	1.97	1.95	2.10
MB	1.09	1.18	1.15	1.20	1.20	1.11	1.03	0.90	0.97	1.20	1.21
SK	0.95	1.01	1.11	1.02	0.97	0.95	0.80	0.98	0.95	1.07	1.09
AB	1.07	1.08	1.04	1.03	1.10	1.06	1.02	0.98	1.10	0.99	0.89
BC	0.97	0.96	1.01	0.97	1.06	1.01	0.92	0.91	0.96	1.06	1.16

TABLE 10: Profile of the BC total expenditures on R&D ($ million)

SECTOR	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Business Sector	348	427	471	591	602	547	573	602	645	850
Higher Education and Private Non-Profit	309	340	330	343	365	360	367	365	447	507
Federal Government	96	86	88	103	80	77	82	85	106	111
Provincial Government and Research Institutions	29	24	27	29	22	25	28	24	26	32

External Indicators

INDICATOR X-1: Percentage of immigrants aged 25 years and older with 16 or more years of education

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CANADA	21.5	20.5	21.7	24.8	28.3	32.7	35.9	36.8	40.1	42.2	43.4	45.0
NFLD	42.1	42.0	46.4	47.5	51.2	48.4	48.5	48.8	49.4	52.8	41.6	44.0
PEI	35.1	25.8	33.7	21.5	33.7	22.6	42.2	34.2	30.9	29.4	38.6	28.2
NS	34.5	39.7	37.7	42.0	42.2	40.3	43.0	44.1	41.5	44.9	48.6	51.1
NB	26.7	29.9	31.5	37.2	42.9	42.8	41.2	46.3	44.8	41.3	46.1	49.9
PQ	25.1	23.9	24.7	27.7	30.1	30.2	30.2	34.4	38.7	40.1	44.2	49.6
ON	20.0	19.0	20.2	23.9	27.2	33.3	37.2	37.8	41.7	44.1	44.6	45.8
MB	18.8	19.4	20.2	26.6	30.7	30.4	34.9	31.6	31.6	29.6	28.6	31.2
SK	32.2	26.1	28.4	32.1	38.9	37.9	37.0	38.7	39.8	38.7	41.2	40.5
AB	20.6	19.0	19.8	22.2	28.2	32.9	34.9	36.7	38.4	39.2	39.8	41.0
BC	21.3	20.4	22.4	24.7	27.8	32.1	35.4	35.8	38.1	39.6	41.1	40.4

INDICATOR X-2: Median years of schooling of immigrants aged 25 years and older

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CANADA	12.2	12.2	12.1	12.1	12.3	12.6	13.6	14.1	14.4	14.8	15.0	15.1	15.3
NFLD	15.0	14.5	14.6	15.1	15.3	15.6	15.3	14.8	15.0	15.4	15.8	14.7	15.2
PEI	12.6	12.9	12.3	13.1	12.2	13.8	12.2	13.7	12.9	13.3	13.4	14.1	12.9
NS	13.5	13.4	14.1	13.9	14.5	14.5	14.2	14.7	14.6	14.7	15.1	15.5	15.7
NB	12.5	12.4	12.5	13.2	14.0	14.7	14.6	14.7	15.1	15.1	14.8	15.1	15.6
PQ	12.4	12.3	12.2	12.2	12.5	13.0	13.1	13.2	13.9	14.4	14.6	15.0	15.6
ON	12.1	12.1	12.0	12.0	12.2	12.5	13.7	14.3	14.5	15.0	15.2	15.2	15.3
MB	12.0	12.0	12.0	12.1	12.4	13.5	13.7	14.0	13.7	13.9	13.8	13.8	14.0
SK	12.1	13.3	12.2	12.4	12.6	14.1	14.0	14.0	14.3	14.5	14.4	14.8	14.7
AB	12.2	12.0	12.0	12.0	12.1	12.6	13.7	14.0	14.3	14.7	14.8	14.9	15.0
BC	12.2	12.2	12.1	12.2	12.3	12.5	13.5	14.0	14.3	14.8	15.0	15.0	15.0

INDICATOR X-3: Net inter-provincial migration (number of persons)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
NFLD	(1,137)	(1,084)	(2,563)	(3,397)	(6,204)	(6,566)	(7,945)	(8,522)	(7,971)	(3916)	(4,884)	(3,380)	(2,504)
PEI	(273)	(415)	232	532	694	368	401	(241)	(15)	212	(62)	554	773
NS	(106)	1,039	355	(1,143)	(2,694)	(1,972)	(1,064)	(2,074)	(1,571)	947	(1,393)	(2,229)	(1,346)
NB	1,014	(79)	(1,087)	(492)	(505)	(931)	(910)	(1,812)	(2,935)	(638)	(1,748)	(1,815)	(424)
PQ	(9,567)	(13,047)	(9,785)	(7,426)	(10,252)	(10,248)	(15,358)	(17,559)	(14,512)	(11712)	(11,233)	(8,375)	(7,789)
ON	(15,117)	(9,978)	(13,530)	(12,771)	(4,527)	(1,764)	(1,706)	6,823	11,466	18424	23,292	11,388	6,479
MB	(8,613)	(7,581)	(6,417)	(5,206)	(4,010)	(3,344)	(3,738)	(6,717)	(3,097)	(2387)	(4,188)	(5,712)	(4,360)
SK	(15,928)	(9,499)	(7,727)	(4,543)	(3,958)	(3,190)	(1,871)	(2,669)	(1,786)	(7146)	(8,301)	(8,461)	(8,272)
AB	11,055	5,511	1,030	(2,355)	(2,684)	4,251	15,069	32,459	40,125	19692	24,397	25,056	23,329
BC	38,704	34,572	39,578	37,595	34,449	23,414	17,798	1,980	(17,521)	(12413)	(14,783)	(6,332)	(5,337)

INDICATOR X-4: Value of high technology imports to BC by commodity type ($ million)*

COMMODITY	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Computers & Telecommunications	833.8	966.4	1,153.7	1,438.3	1,464.2	1,463.1	1,940.3	2,132.9	2,087.3	2,420.5	2,339.5	2,175.6
Computer Integrated Manufacturing	77.8	82.2	113.3	168.4	154.5	145.2	183.3	133.8	153.0	186.9	166.1	162.6
Aerospace	420.4	428.5	232.6	305.7	256.2	427.0	532.7	501.1	672.0	539.6	835.2	764.4
Life Sciences	124.7	138.0	161.3	228.5	253.6	267.6	276.1	313.9	367.5	448.6	506.7	540.2
Other	172.1	216.6	269.1	546.1	628.8	540.0	726.4	896.5	969.5	879.7	632.3	443.4
TOTAL	1,628.9	1,831.8	1,930.0	2,687.0	2,757.2	2,842.9	3,658.8	3,978.1	4,249.3	4,475.3	4,479.8	4,086.2

* These figures should not be compared to those previously published by BC Stats since a new definition of high tech commodities, which is far more exclusive, has been applied in this edition, and the numbers are significantly lower than those calculated based on the old definition.

Labour Indicators

INDICATOR L-1: Unemployment rate for natural and applied science occupations (%)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CANADA	4.1	5.1	5.8	5.9	4.8	4.3	4.2	3.5	3.5	3.4	2.9	3.9	4.5
NFLD	7.9	7.5	9.3	7.9	7.1	3.1	7.1	6.5	8.4	9.1	7.9	7.9	9.0
PEI	14.3	16.7	20.8	13.3	20.8	20.8	13.3	15.4	12.5	9.4	6.9	5.7	7.9
NS	5.3	7.4	7.1	6.1	7.4	5.1	5.7	6.5	5.1	3.9	5.1	4.5	5.9
NB	5.5	4.4	6.8	7.9	6.8	5.5	5.1	5.9	6.6	5.1	5.7	5.2	5.3
PQ	6.0	5.8	6.4	7.5	5.8	5.7	5.4	4.6	4.5	3.6	3.1	4.2	4.2
ON	2.6	4.8	5.3	5.1	4.0	3.3	3.4	2.8	2.7	3.1	2.7	3.6	4.8
MB	2.5	4.0	4.9	5.6	5.1	2.5	2.9	2.6	2.8	2.3	3.2	2.9	3.3
SK	3.7	3.5	6.3	5.2	5.7	3.4	4.3	3.5	2.9	4.9	4.6	2.6	2.8
AB	3.9	4.4	6.4	5.2	4.2	4.0	4.0	2.2	2.2	3.1	2.7	2.7	3.0
BC	5.1	5.0	4.9	5.1	4.2	4.0	4.0	3.5	4.5	3.3	2.3	4.7	5.2

INDICATOR L-2: Research workforce per 100,000 population, 1995 and 1998*

	Federal FTE		Provincial FTE		Business FTE		Higher education FTE		Other FTE		Total FTE		FTE per 100,000	
	1995	1998	1995	1998	1995	1998	1995	1998	1995	1998	1995	1998	1995	1998
CANADA	15,220	13,680	3,030	2,830	72,070	76,480	42,360	44,160	1,920	2,390	134,600	139,540	460	463
NFLD	200	210	60	0	160	200	1,430	720	0	0	1,850	1,130	326	207
PEI	90	80	0	0	40	50	0	100	0	0	130	230	96	168
NS	670	660	130	0	610	640	2,280	760	20	20	3,710	2,080	400	222
NB	280	260	70	100	540	380	1,240	760	40	30	2,170	1,530	289	203
PQ	2,080	2,000	860	880	22,260	24,980	10,820	13,500	410	490	36,430	41,850	503	571
ON	8,900	8,140	1,040	580	36,350	38,770	15,510	16,420	1,020	1,220	62,820	65,130	573	572
MB	950	440	50	60	1,120	980	2,020	1,480	200	250	4,340	3,210	384	282
SK	490	450	160	260	750	730	1,700	1,300	0	0	3,100	2,740	306	267
AB	870	750	450	650	3,820	4,060	3,490	4,240	180	350	8,810	10,050	322	346
BC	690	690	210	300	6,420	5,690	3,870	4,880	50	30	11,240	11,590	297	290

FTE: full time equivalent position

* 1998 is the latest year of which information is available

APPENDIX III

TABLE 10: Structure of the research workforce by sector in 1998*

	Federal	Provincial	Business	Higher education	TOTAL FTE
PQ	4.8%	2.1%	60.4%	32.6%	41,360
ON	12.7%	0.9%	60.7%	25.7%	63,910
AB	7.7%	6.7%	41.9%	43.7%	9,700
BC	6.0%	2.6%	49.2%	42.2%	11,560

FTE: full time equivalent position

*1998 is the latest year of which information is available

INDICATOR L-3: Quality of life index scores, 2002 (New York = 100)

	Score	Global Rank	North Am. Rank
Vancouver	106.0	2	1
Toronto	103.0	18	2
San Francisco	103.0	18	2
Honolulu	102.5	22	4
Ottawa	102.0	25	5
Montreal	102.0	25	5
Calgary	101.5	31	7
Seattle	101.5	31	7
Los Angeles	101.0	35	9

INDICATOR L-4: All Items inter city retail price index (units)

	Oct-99	Oct-01
Edmonton	93	93
Montreal	95	94
Ottawa	103	104
Vancouver	105	106
Toronto	108	110

Reference Tables

REFERENCE TABLE 1: Total population

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CANADA†	27,941,019	28,283,895	28,608,974	28,940,777	29,256,392	29,572,384	29,887,239	30,149,412	30,410,441	30,691,885	31,011,043	31,313,948
NFLD	579,525	580,162	580,195	574,828	567,954	560,584	554,076	545,300	540,895	537,877	533,816	531,595
PEI	130,312	130,878	132,343	133,691	134,788	136,188	136,852	136,891	137,757	138,341	138,904	139,913
NS	915,068	919,350	923,704	926,322	927,710	931,235	934,538	936,084	941,185	942,315	942,884	944,765
NB	745,546	748,463	749,530	750,942	751,782	752,995	754,237	753,346	755,517	755,617	755,953	756,652
PQ	7,064,735	7,112,810	7,165,199	7,207,302	7,241,429	7,274,019	7,302,553	7,323,636	7,351,191	7,381,766	7,417,732	7,455,208
ON	10,427,621	10,570,475	10,690,447	10,827,501	10,964,925	11,100,876	11,249,490	11,387,413	11,527,866	11,697,569	11,894,863	12,068,301
MB	1,109,594	1,113,102	1,118,356	1,123,852	1,129,771	1,134,346	1,136,584	1,137,908	1,142,545	1,146,444	1,149,118	1,150,848
SK	1,002,668	1,003,987	1,006,949	1,009,685	1,014,172	1,019,459	1,022,020	1,024,875	1,025,564	1,021,963	1,017,087	1,011,808
AB	2,592,551	2,634,361	2,670,726	2,704,904	2,739,853	2,780,639	2,837,191	2,906,846	2,959,641	3,009,860	3,059,107	3,113,586
BC	3,373,399	3,470,307	3,571,525	3,681,750	3,784,008	3,882,043	3,959,698	3,997,113	4,028,280	4,060,133	4,101,579	4,141,272

† Canada is the sum of the 10 provinces.

REFERENCE TABLE 2: Population aged 15 years and older

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CANADA†	21,540,600	21,867,300	22,179,700	22,440,000	22,726,500	23,030,700	23,359,300	23,671,100	23,969,000	24,284,900	24,617,800	24,945,100
NFLD	444,300	447,400	449,500	448,900	447,000	444,600	442,600	439,400	438,400	439,900	439,400	439,000
PEI	98,600	99,600	101,000	102,400	103,600	104,800	105,900	106,700	107,900	109,500	110,500	111,800
NS	703,500	708,300	713,000	716,300	719,800	724,700	730,200	734,900	740,800	747,700	751,600	755,600
NB	575,600	580,200	583,200	585,400	587,800	591,000	594,300	596,300	599,500	603,500	605,700	607,600
PQ	5,518,900	5,577,200	5,631,500	5,675,200	5,720,200	5,764,300	5,807,300	5,849,700	5,893,300	5,935,900	5,984,600	6,033,400
ON	8,094,200	8,229,200	8,353,200	8,448,900	8,563,000	8,681,000	8,821,800	8,966,600	9,111,100	9,274,400	9,455,400	9,628,100
MB	827,500	829,900	832,900	834,400	836,800	840,400	843,500	846,400	852,000	858,500	862,400	864,500
SK	731,600	733,300	736,300	739,100	743,500	749,400	753,900	759,200	762,800	763,700	761,700	759,200
AB	1,928,900	1,964,100	1,996,300	2,022,300	2,053,600	2,093,400	2,147,400	2,213,200	2,270,400	2,315,100	2,366,700	2,420,800
BC	2,617,600	2,698,000	2,782,700	2,867,100	2,951,200	3,036,900	3,112,300	3,158,700	3,192,900	3,236,600	3,279,900	3,325,000

† Canada is the sum of the 10 provinces.

APPENDIX III

REFERENCE TABLE 3: Number of households

	1996	1997	1998	1999	2000	2001
CANADA†	10,650,340	10,851,840	11,017,230	11,209,960	11,361,810	11,552,010
NFLD	184,920	184,520	184,940	185,830	188,830	190,580
PEI	47,600	48,110	48,760	50,020	50,380	50,580
NS	328,490	340,220	338,960	348,010	350,790	355,160
NB	264,510	269,430	273,700	277,200	276,160	281,780
PQ	2,771,560	2,825,110	2,843,900	2,869,180	2,930,590	2,953,150
ON	3,924,200	3,974,730	4,043,020	4,147,740	4,210,680	4,302,710
MB	403,870	402,420	406,860	406,390	407,970	412,250
SK	356,390	365,120	364,720	366,560	372,500	371,220
AB	962,840	993,800	1,020,710	1,044,520	1,056,890	1,084,100
BC	1,405,960	1,448,380	1,465,310	1,487,090	1,517,030	1,520,870

† Canada is the sum of the 10 provinces.

REFERENCE TABLE 4: Population of immigrants aged 25 years or older

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CANADA	150,805	164,233	159,936	140,252	132,644	141,097	135,121	108,978	121,261	145,653	160,903	148,934
NFLD	430	536	506	364	369	401	266	240	249	250	214	243
PEI	97	89	95	93	101	84	90	79	81	109	83	71
NS	949	1,356	1,659	1,773	1,886	1,747	1,529	1,074	961	930	1,037	867
NB	434	502	454	379	406	456	417	460	422	467	488	435
PQ	32,729	29,954	26,215	15,791	15,960	17,921	16,613	15,846	18,032	20,538	24,169	25,045
ON	78,238	90,790	84,856	74,319	72,463	74,910	73,666	57,934	66,473	85,580	95,190	86,422
MB	3,524	3,177	2,920	2,534	2,277	2,444	2,234	1,758	2,154	2,537	2,602	2,609
SK	1,524	1,519	1,489	1,372	1,245	1,126	1,066	984	1,067	1,100	968	948
AB	10,809	11,485	11,732	11,395	9,016	8,726	8,201	7,071	7,827	9,101	10,324	9,506
BC	21,527	24,493	29,664	31,885	28,734	33,132	30,886	23,394	23,836	24,869	25,583	22,656
TOTAL (10 prov.)	150,261	163,901	159,590	139,905	132,457	140,947	134,968	108,840	121,102	145,481	160,658	148,802

REFERENCE TABLE 5: Unemployment rate for all occupations (%)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CANADA	8.1	10.3	11.2	11.4	10.4	9.4	9.6	9.1	8.3	7.6	6.8	7.2	7.7
NFLD	16.9	18.0	20.2	20.4	20.2	18.1	19.3	18.6	18.0	16.9	16.7	16.1	16.9
PEI	14.6	16.7	18.1	17.6	17.2	15.0	14.7	15.4	13.8	14.4	12.0	11.9	12.1
NS	10.5	12.1	13.2	14.3	13.5	12.1	12.3	12.1	10.5	9.6	9.1	9.7	9.7
NB	12.1	12.8	13.0	12.5	12.4	11.2	11.6	12.7	12.2	10.2	10.0	11.2	10.4
PQ	10.4	12.1	12.7	13.3	12.3	11.4	11.9	11.4	10.3	9.3	8.4	8.7	8.6
ON	6.2	9.5	10.7	10.9	9.6	8.7	9.0	8.4	7.2	6.3	5.7	6.3	7.1
MB	7.3	8.6	9.2	9.3	8.6	7.2	7.2	6.5	5.5	5.6	4.9	5.0	5.2
SK	7.0	7.4	7.9	8.2	6.8	6.6	6.6	5.9	5.7	6.1	5.2	5.8	5.7
AB	6.8	8.1	9.4	9.6	8.7	7.8	6.9	5.8	5.6	5.7	5.0	4.6	5.3
BC	8.6	10.1	10.2	9.7	9.0	8.4	8.7	8.4	8.8	8.3	7.2	7.7	8.5

REFERENCE TABLE 6: Gross domestic product ($ million)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CANADA	679,921	685,367	700,480	727,184	770,873	810,426	836,864	882,733	914,973	980,524	1,064,995	1,092,246	1,142,123
NFLD	9,219	9,587	9,549	9,771	10,264	10,652	10,417	10,533	11,176	12,186	13,77[illegible]	13,761	15,982
PEI	2,169	2,255	2,345	2,471	2,521	2,66[illegible]	2,823	2,800	2,981	3,173	3,394	3,480	3,767
NS	16,993	17,650	18,094	18,343	18,667	19,296	19,512	20,368	21,401	22,970	24,224	25,203	26,193
NB	13,458	13,647	14,038	14,693	15,286	16,380	16,626	16,845	17,633	19,005	20,008	20,507	20,888
PQ	153,330	155,156	158,362	162,229	170,478	177,331	180,526	188,424	196,258	210,166	224,165	229,617	242,914
ON	282,834	283,094	286,493	293,405	311,096	329,317	338,173	359,353	377,897	409,099	433,446	443,852	470,567
MB	24,193	24,029	24,434	24,590	25,958	26,966	28,434	29,751	30,972	31,943	33,486	34,707	36,527
SK	21,227	21,393	21,220	22,928	24,480	26,425	28,944	29,157	29,550	30,497	33,708	33,305	34,526
AB	73,257	72,892	74,936	81,179	88,041	92,036	98,634	107,048	107,439	116,467	144,672	151,319	150,469
BC	79,350	81,849	87,242	94,077	100,512	105,670	108,865	114,383	115,641	120,599	129,356	130,859	134,365
TOTAL (10 prov.)	676,030	681,552	696,713	723,686	767,303	806,735	832,954	878,662	910,948	976,105	1,060,229	1,086,610	1,136,198

APPENDIX III

REFERENCE TABLE 7: Gross domestic product ($1997 million, chained)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CANADA	765,311	749,294	755,848	773,528	810,695	833,456	846,952	882,733	918,910	968,451	1,012,335	1,027,523	1,062,143
NFLD	10,255	10,301	10,148	10,231	10,672	10,913	10,407	10,533	11,107	11,750	12,440	12,603	14,296
PEI	2,341	2,335	2,399	2,427	2,546	2,708	2,789	2,800	2,928	3,049	3,168	3,169	3,348
NS	18,730	18,570	18,831	19,011	19,090	19,410	19,529	20,368	21,127	22,247	22,657	23,233	24,108
NB	15,000	14,999	15,243	15,681	16,013	16,533	16,652	16,845	17,462	18,529	18,785	18,972	19,593
PQ	170,851	166,241	166,930	170,259	177,782	180,781	182,564	188,424	194,414	205,856	215,499	217,935	227,263
ON	316,929	304,468	307,233	310,170	328,500	340,081	343,826	359,353	376,716	405,352	424,096	430,501	447,122
MB	27,254	26,339	26,614	26,711	27,753	27,828	28,683	29,751	31,014	31,601	32,399	32,850	33,641
SK	24,945	25,219	24,251	25,846	26,968	27,269	28,063	29,157	30,398	30,347	31,203	30,797	30,373
AB	82,518	82,925	83,691	89,695	95,278	98,268	100,264	107,048	112,677	113,651	120,137	122,903	125,030
BC	95,722	95,897	98,373	102,770	105,669	108,194	110,857	114,383	115,883	119,122	124,187	123,912	126,141
TOTAL (10 prov.)	764,545	747,294	753,713	772,801	810,271	831,985	843,634	878,662	913,726	961,504	1,004,571	1,016,875	1,050,915

REFERENCE TABLE 8: Employment (15 years and over)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CANADA	11,133,411	10,812,178	10,830,322	10,993,335	11,227,217	11,309,396	11,641,467	11,901,929	12,072,836	12,479,795	12,775,611	13,077,759
NFLD	161,301	157,504	157,159	162,398	164,008	162,787	158,924	162,465	164,029	166,875	173,570	181,779
PEI	42,143	42,143	43,361	43,503	46,438	49,313	47,561	49,039	51,417	53,115	56,729	58,771
NS	312,932	306,083	307,924	312,970	320,329	323,252	333,172	336,559	339,717	348,485	358,961	368,188
NB	261,125	253,574	255,665	257,392	262,402	266,230	269,999	273,548	277,645	283,291	293,023	298,774
PQ	2,785,176	2,666,557	2,656,218	2,672,643	2,715,081	2,716,227	2,789,063	2,838,837	2,873,342	2,963,588	3,016,345	3,091,932
ON	4,422,220	4,277,381	4,255,063	4,287,600	4,384,960	4,414,084	4,536,943	4,667,832	4,756,778	4,896,221	4,997,982	5,105,535
MB	406,459	405,329	403,580	413,716	426,551	431,040	435,597	445,938	463,785	483,837	501,280	515,975
SK	321,673	321,572	321,649	323,820	330,199	333,760	344,986	351,348	355,377	365,936	370,501	377,479
AB	1,083,393	1,048,158	1,042,868	1,084,830	1,092,574	1,111,492	1,185,880	1,225,329	1,235,166	1,301,514	1,367,230	1,420,018
BC	1,304,529	1,300,271	1,352,577	1,399,063	1,448,410	1,462,760	1,499,676	1,511,198	1,513,928	1,574,301	1,595,370	1,612,737